

Winchell Library of Geology



# Rock Products

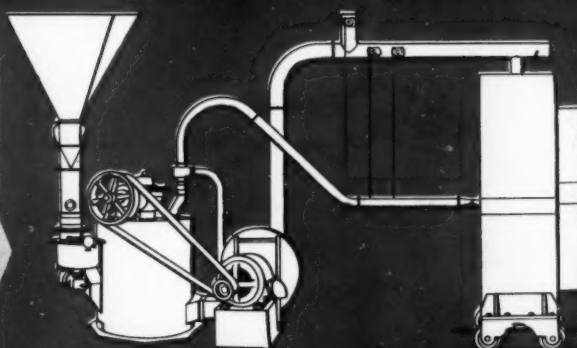
and

**CEMENT** and **ENGINEERING NEWS** (Est. 1896)

THE OLDEST PUBLICATION IN ITS FIELD AND THE RECOGNIZED AUTHORITY

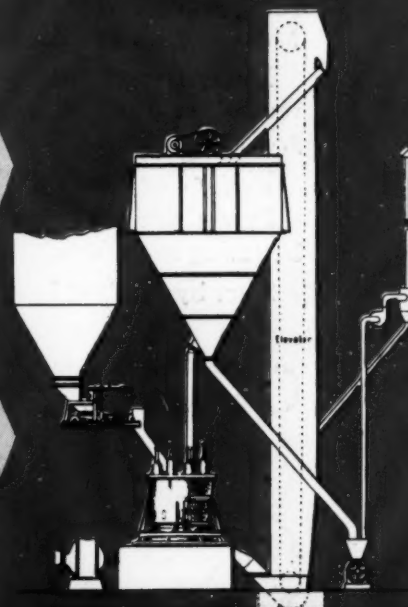
## AUTOMATIC CONTROL

Improves combustion  
Reduces coal consumption  
in DIRECT FIRING



Assures maximum output  
per unit of power used  
for RAW MATERIAL GRINDING

Sustains fineness at any degree  
up to 3100 sq. cm. per gram,  
in CLINKER GRINDING



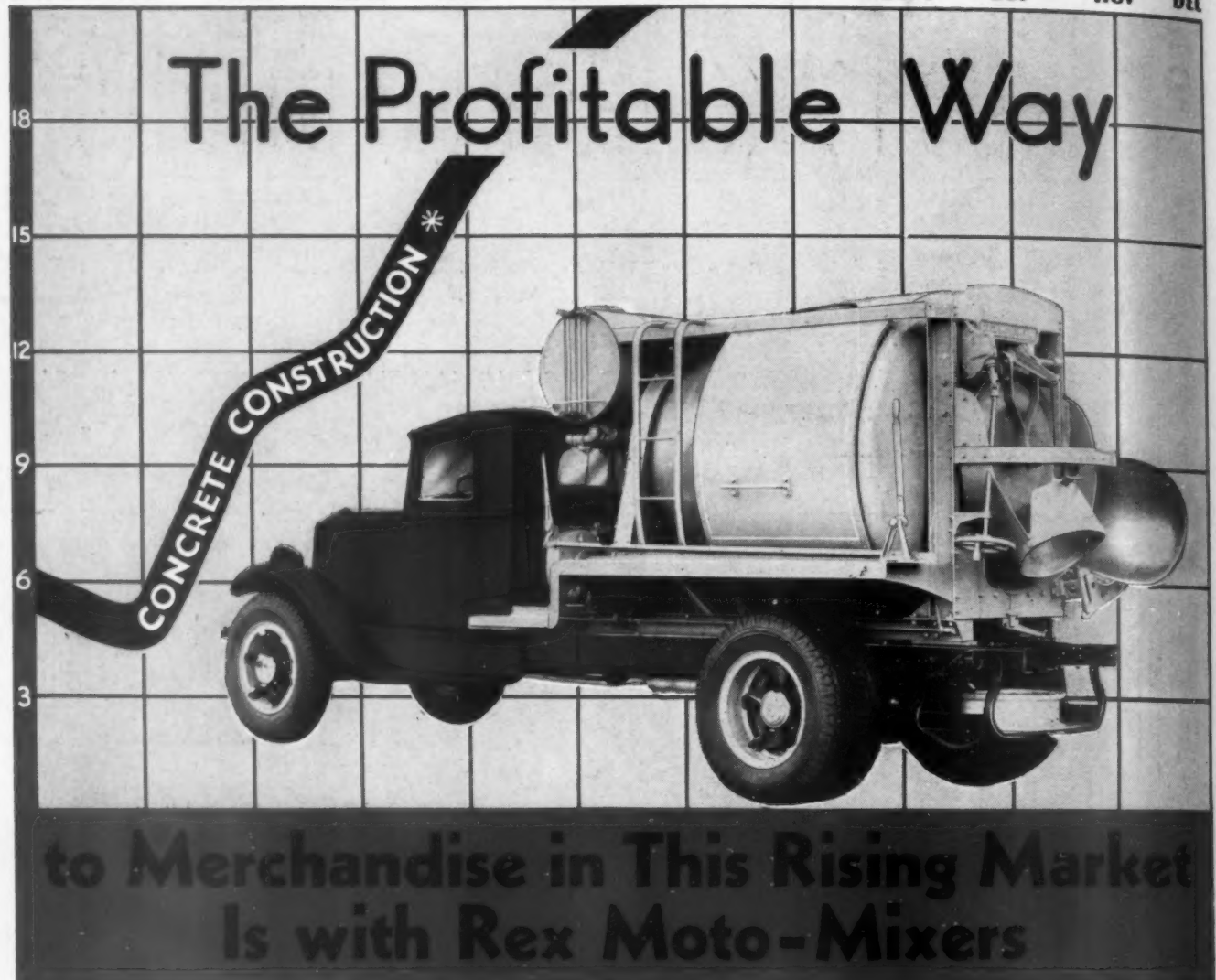
The Babcock & Wilcox Company,  
85 Liberty Street, New York

# BABCOCK & WILCOX

August, 1936

## Rock Products

JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC



\* Concrete Construction in Millions of Cubic Yards Based on Cement Shipments

Cement, sand, gravel and stone are moving faster every month.

The profitable way to get your share of this market, to make your sand, gravel and stone move faster, is to mix and move them in Rex Moto-Mixers and Agitators.

Every month also finds more cement and more aggregate mixed and moved as ready-mixed concrete in Rex Moto-Mixers, and moved profitably.

Bigger Pay Loads and Lower Ton-Mile costs spell profit on every yard.

Investigate now this modern, profitable way of increasing tonnage, bettering margins with Rex Moto-Mixers.

Start by sending for the book "Rex Moto-Mixers and Agitators."

**CHAIN BELT COMPANY**  
OF MILWAUKEE

**REX** Moto-Mixers



**READY-MIXED CONCRETE**

Send today for a copy of the book — "Rex Moto-Mixers and Agitators." It describes the 1936 way to secure a better margin on this modern, profitable method of selling cement and aggregates. It illustrates the new 1936 Rex Moto-Mixer features.

**CHAIN BELT COMPANY**  
1649 W. Bruce Street Milwaukee, Wis.



# LINK-BELT

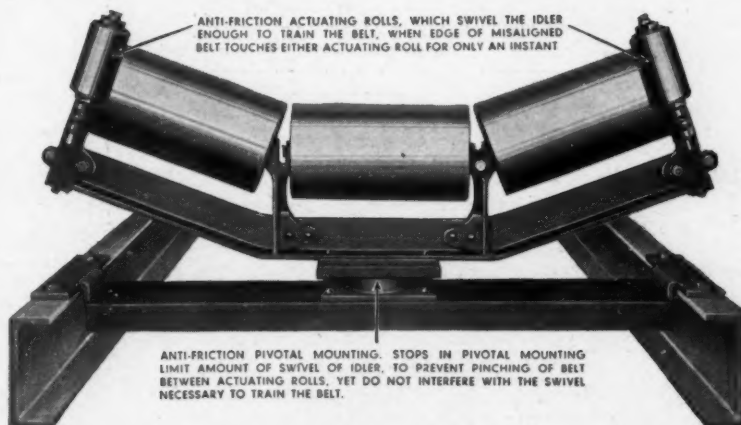
## POSITIVE SELF-ALIGNING IDLER

*Keeps Troughed Conveyor Belts Lined Up Without Injuring Belt Edges*



● This Link-Belt POSITIVE Self-Aligning Idler automatically and positively maintains troughed conveyor belts central at all times. It has met with unqualified success, and is preferred by many who have heretofore been using the counter-weighted disc type of self-aligning idler.

Either type is to be greatly preferred to using stationary "guide idlers," which do not correct or overcome belt misalignment, but merely restrain forcibly any further sidewise movement of the belt. For proper training, and longer life of the belt, use the pivoted self-aligning idler.



*Send for Catalog. Return the Coupon.*

### LINK-BELT COMPANY

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Please send copy of Folder No.

Name .....

Company .....

Address .....

City ..... State .....



5534-C

(Rock Products)

#### LINK-BELT PRODUCTS INCLUDE:

Complete Sand, Gravel, and Stone Washing Plants . . . Screens (vibrating, rotary and conical) . . . Washers and classifiers, of the screw, log, flight, Shaw, Rotoscoop and conical types . . . Conveyors and Elevators (belt, flight, screw, bucket, all approved types) . . . Crawler Shovels-Draglines . . . Portable Loaders . . . Silverstreak Silent Chain Drives . . . Silverlink Roller Chain Drives . . . Speed Reducers . . . Motorized Reducers . . . Variable Speed Transmissions (P. I. V. Gear and V. R. D. types) . . . Chains (Malleable Iron, PROMAL and Steel) . . . Sprockets . . . Gears . . . Pillow Blocks, Clutches, Pulleys, Couplings—Complete power transmission equipment.

# Rock Products

With which is  
Incorporated

**CEMENT and ENGINEERING NEWS**

Founded  
1896

Entered as second-class matter, Jan. 30, 1936, at the  
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August, 1936

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(Rock Products is indexed in the "Industrial Arts Index," which can be found in any Public Library)

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## TRADEPRESS PUBLISHING CORPORATION

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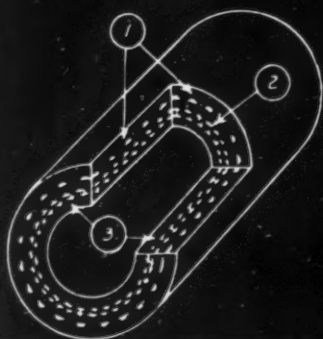
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# WHICH WOULD YOU BUY?



- 1 Heavy super-tough tire stock cover that resists severest abrasion.
- 2 Braided Carcass that holds high pressures and absorbs "tow-rope" strains.
- 3 Thick, slow-ageing, non-cracking, oil-resisting tube of special Goodyear compound.

G. T. M.-specified  
GOODYEAR CORD AIR HOSE



**T**his unretouched photograph shows you how Goodyear Air Hose (left) compares with other makes after the same length of service under identical conditions. Note that the tube of the Goodyear Hose shows practically no deterioration from oil — whereas the other is deeply rotted and flaking badly! This slow-ageing, non-cracking, oil-resisting tube — an exclusive development of the world's largest rubber manufacturer — explains why Goodyear Air Hose gives so much longer and lower cost service without clogging tools!

*This service-proved construction is embodied in all five brands of Goodyear Air Hose for every type of service. For further data write Goodyear, Akron, Ohio, or Los Angeles, California — or the nearest Goodyear Mechanical Rubber Goods Distributor.*

BELTS  
MOLDED GOODS  
HOSE  
PACKING

THE GREATEST NAME  IN RUBBER  
**GOOD YEAR**

# *Break-downs CAN be avoided*



## *..if you act NOW*

MOST BREAK-DOWNS creep up on you unawares. And faulty lubrication is to blame in many cases.

You can avoid most break-downs if you make sure the lubricants you use are *right* for each specific piece of machinery.

To help you in this, we offer you the entire resources of our extensive organization.

Daily reports from our lubrication engineers give us up-to-the-minute knowledge of operating conditions in mines and quarries — everywhere. This enables us to produce the one best lubricant for each individual operating requirement.

There are many Texaco Lubricants . . . each one designed to do a specific job well . . . available in all States.

There is also available a highly-trained lubrication engineer who knows the ability of each of these products. He is intimately acquainted with the lubrication of the type of machinery you operate and can help you with your operating problems.

A Texaco representative will be glad to provide practical engineering service to prove the economies of Texaco Products.



☆ ☆ ☆

THE TEXAS COMPANY  
135 East 42nd St., New York City  
*Nation-wide distribution facilities  
assure prompt delivery*

## **TEXACO** *Industrial Lubricants*

# STRIPPING COSTS...

Can Be Reduced



WITH THE

## NEW AUSTIN-WESTERN 5-YARD SCRAPER

Replaces cumbersome shovels or drag lines.

Does the job faster and cheaper.

Every operation accomplished by a single cable from a vertical winch requiring no fairlead... cuts 6 feet wide and up to 6 inches deep... spreads to 9 inch depth... built to hug banks and work slopes... open top for shovel loading, etc... 35-50 horsepower tractor pulls it easily.

★ Price only \$2400 complete with winch and cable, f. o. b. Aurora, Ill.

● Producers who want to reduce stripping costs can now own a 5-yard scraper that is cheap to operate and low in first cost.

The majority of producers will find this new scraper superior to shovels or draglines in speed and flexibility.

It costs you nothing to investigate the possibilities of this equipment. Ask us to send a salesman who will give you all the facts as they apply to your problem, or use the coupon for details of construction and operation.

### The Austin-Western Road Machinery Co.

Home Office: Aurora, Ill. Cable Address: AWCO, Aurora, Ill., U. S. A.

Branches and Warehouses in Principal Cities

# Austin-Western

ROAD GRADERS • MOTOR GRADERS • ELEVATING GRADERS • DRAGS  
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SCARIFIERS • BULLDOZERS • TRAILERS • SCRAPERS • PLOWS  
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CRUSHING AND WASHING PLANTS • SWEEPERS AND SPRINKLERS • SHOVELS • CRANES • ETC • SNOW PLOWS

The Austin-Western Road Machinery Co.  
V, Aurora, Illinois

Send your bulletin on the 5-yard scraper.

Name.....657-1

Address.....

City.....State.....



# 1¢ ...OR LESS PER K.W.H. POWER

ICE PLANTS • QUARRIES • FLOUR & FEED MILLS  
• INDUSTRIAL PLANTS • MINES • ETC.

In plants such as these, and in hundreds of others, CP Diesels are consistently producing dependable power for ONE CENT per K.W.H.—or less!

Let our experienced engineers study your power needs and prove the economy of CP Diesels. Your request for a survey involves no obligation.

**CHICAGO PNEUMATIC TOOL COMPANY**  
ENGINE MANUFACTURERS FOR MORE THAN 30 YEARS

6 EAST 44th STREET  
NEW YORK • N. Y.

**CHICAGO  
PNEUMATIC DIESELS**

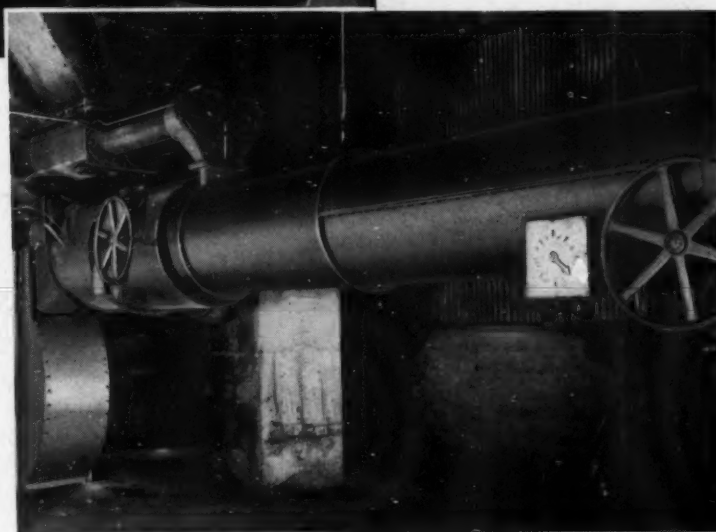
M-1-36



# OVER and OVER AGAIN—

the heat is used until there's very little left—in the Traylor Recuperator-Kiln-Burner-Cooler system.

SEND FOR  
BULLETIN  
NO. 116



TOP—COLTON-LANG  
RECUPERATOR

MIDDLE—TRAYLOR-  
CHEESMAN BURNER

BOTTOM—TRAYLOR-  
CHEESMAN COOLER

Air enters the Traylor-Cheesman Cooler, is heated to 900° or better by the clinker—then it constitutes nearly 80% of the air for combustion delivered to the kiln by the Traylor-Cheesman Burner — when it has calcined the clinker it dries the incoming slurry in the Colton-Lang Recuperator to small moisture content—and finally escapes up the kiln stack at around 250° F. The result is a very satisfactory saving of kiln fuel on two counts—preheating of combustion air and drying of slurry.



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Timmons, Ontario, Canada—P. O. Box 113

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Manila and Baguio, P. I.

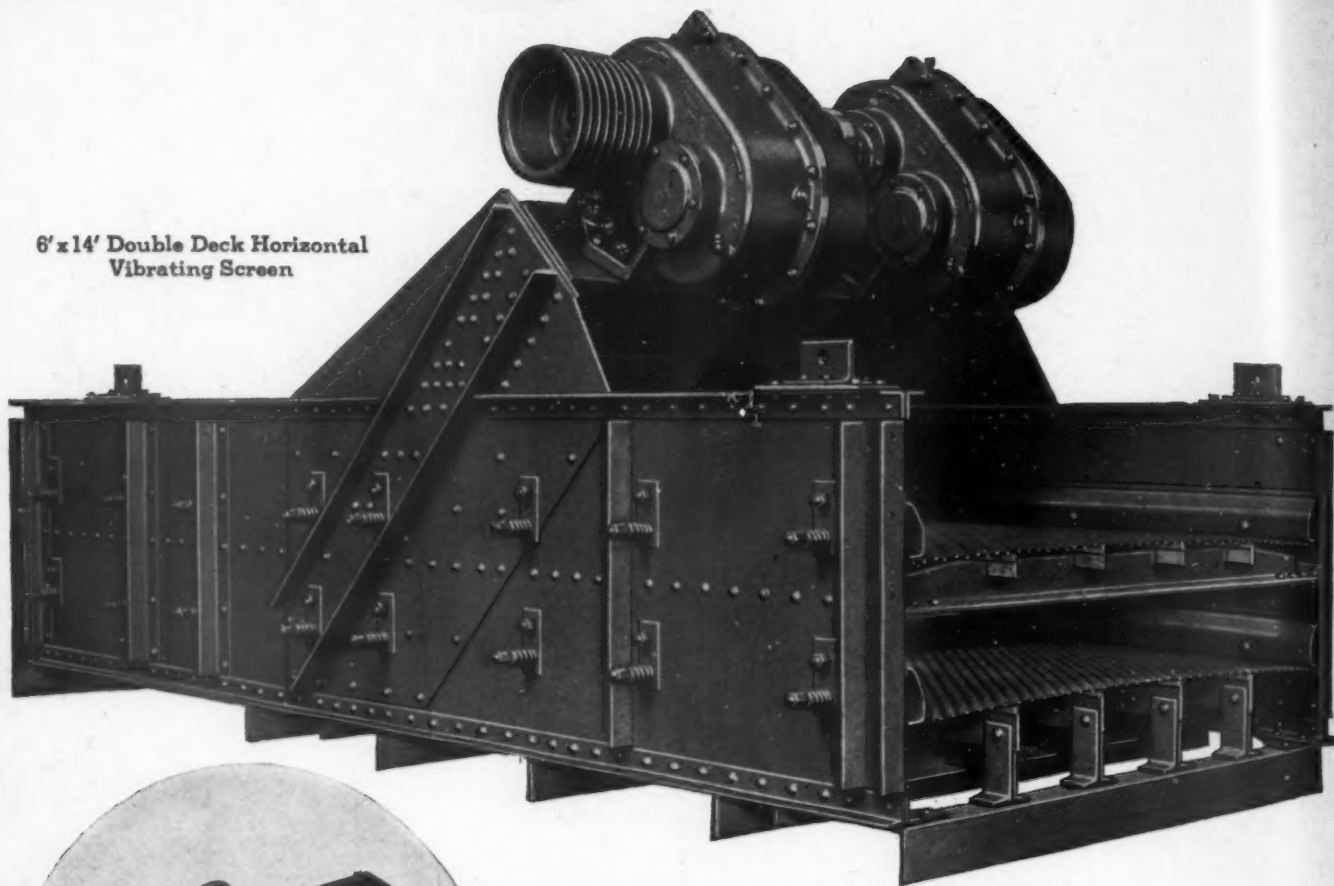
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Johannesburg, Transvaal, S. A.

Export Department—104 Pearl St., New York City. Foreign Sales Agencies: London, Lima, Sao Paulo, Rio de Janeiro, Buenos Aires, Santiago, Valparaiso, Antofagasta, Iquique, Oruro

European Works—Usines Carels Freres, Ghent, Belgium

# Low Headroom - Large Tonnages

6' x 14' Double Deck Horizontal  
Vibrating Screen



1' x 2' 6" Horizontal  
Screen

**T**HE NEW Allis-Chalmers Low-Head vibrating screen is filling a definite need in many plants. Its minimum space requirements enable it to be installed in places that would accommodate no other type of screen. Very little change in plant layout is needed.

Not only are Low-Head screens easy to install but they handle large tonnages with high screening efficiency and low power consumption. They are built in sizes ranging from 3'x6' to 6'x14', single, double or triple decks.

*Write for Bulletin 1478.*

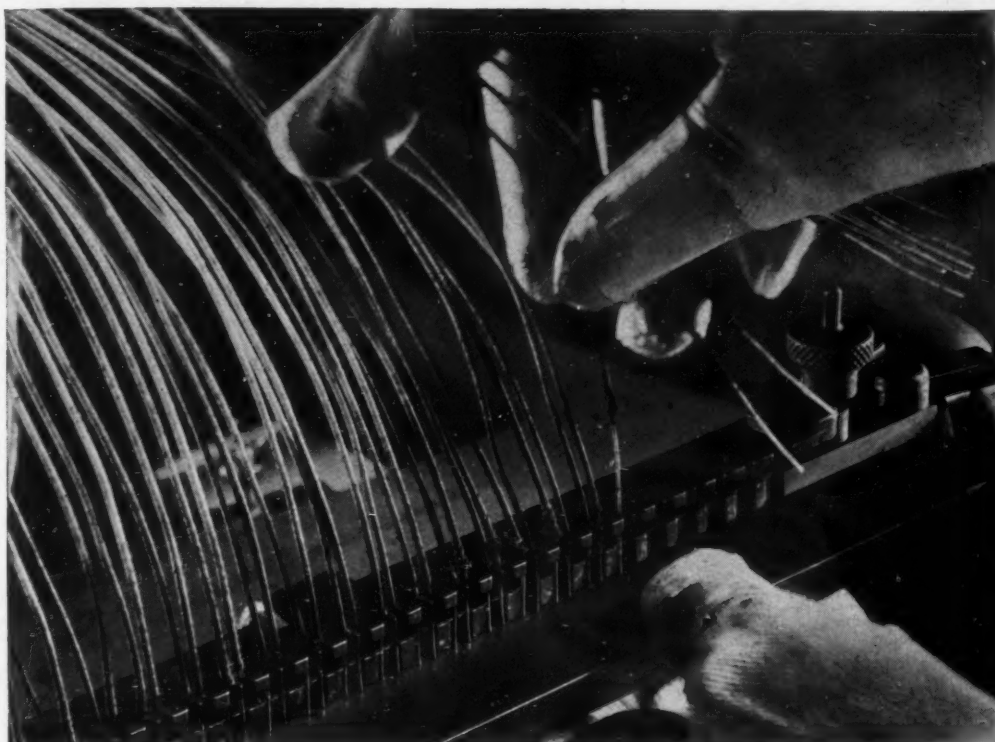
CRUSHING AND CEMENT DIVISION

# ALLIS-CHALMERS



M I L W A U K E E W I S C O N S I N

# MAKING BETTER BLASTING CAPS



## Here's Where Wires Come into the Picture

You get results with Hercules electric blasting caps because of the Hercules method of setting the leg wires of the firing unit.

The leg wires of each cap are carefully spaced inside of mold, into which a molten composition is poured to form a plug. This plug, holding the leg wires rigid, is the basis of the firing assembly inside the cap. This precision construction assures the correct position of the wires in the firing assembly — an important aid to sure detonation of the cap.



Exacting attention to details, such as this, helps in obtaining satisfactory blasting results. That is why so many operators insist on Hercules detonating devices.

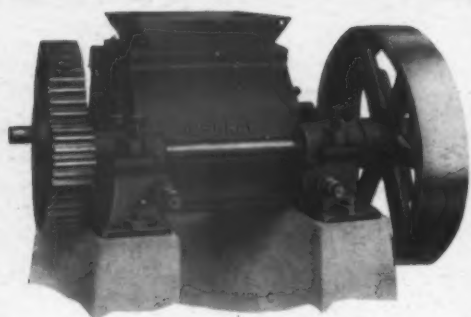
**HERCULES POWDER COMPANY**  
INCORPORATED

946 KING STREET, WILMINGTON, DELAWARE

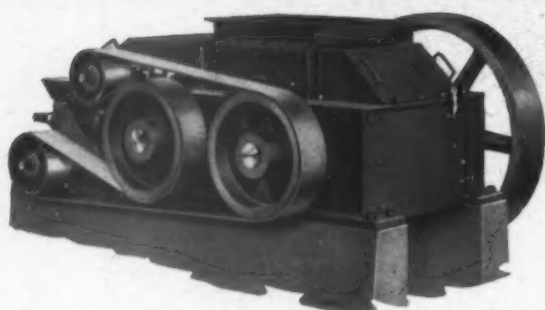
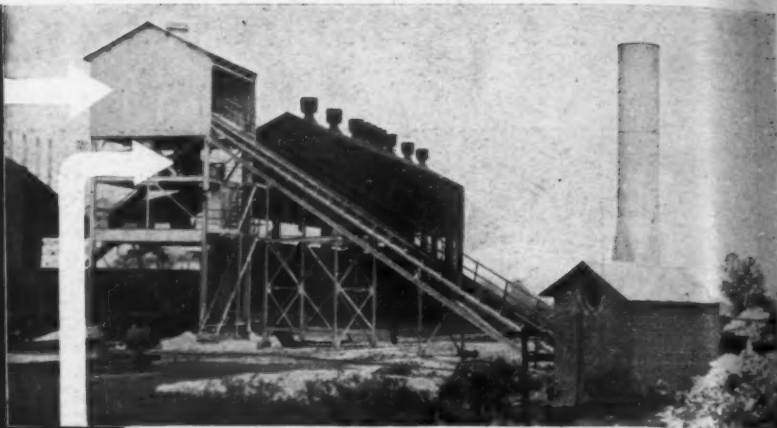
**Blasting Caps  
Electric Blasting Caps  
Delay Electric Igniters  
"No Vent" Delays  
Electric Squibs**

Please send information on Hercules Explosives and Blasting Supplies.

Name   
Address   
City  State  J-19



Jeffrey Single Roll Crusher



Jeffrey Double Roll Crusher

# JEFFREY CRUSHERS

## *Reduce* SUPEROCK

When the Superock Company of Thomas, Alabama, was confronted with the need for units to efficiently reduce a very unusual product . . . they decided upon Jeffrey Crushers . . . two of them.

SUPEROCK, a light-weight concrete aggregate derived from molten blast furnace slag, is discharged from a belt directly to a 30"x30" Jeffrey Single Roll Crusher, which reduces it to 1½-inch minus. From this crusher, the "run of the mill" material can be loaded directly into railroad cars through a chute . . . or passes to a Jeffrey 30"x36" Double Roll Crusher for a further reduction.

This is just another instance where Jeffrey Crushers met an unusual demand. Another instance of Jeffrey superiority.

Jeffrey Crushers, Pulverizers and Shredders are made in various types, sizes and capacities . . . all designed for long, efficient, economical, trouble-free service. Besides Reduction Machinery, the Jeffrey line includes a very wide and complete range of material handling equipment of interest to every plant operator striving for maximum results at the lowest possible cost.



Call on Jeffrey Engineers if you want a better way to handle or reduce your material. Write today.

---

## THE JEFFREY MANUFACTURING CO.

935-99 NORTH FOURTH ST., COLUMBUS, OHIO

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## IT'S A PIPE! WITH GOODRICH RUBBER

**S**EWERS used to be little more than covered ditches. Joints broke, causing soil contamination, and allowing roots to grow into the pipe . . . frequent repairs were an expected cost.

A Goodrich engineer knew that certain rubber compounds would retain resilience and life permanently, under constant compression.

With one of these compounds he developed a gasket of an entirely new design. Equipped with fins, it slides into a bell-and-spigot joint easily, but outward pressure spreads the fins so that they grip, and the gasket cannot be

forced out. A sewer line laid with this Goodrich gasket becomes a permanent pipe, instead of a costly temporary ditch. Repairs and expense are a thing of the past.

Long life is only one of a dozen properties Goodrich has helped add to rubber. Many of these new properties are startling—Goodrich makes one rubber so tough that in abrasive service it outwears steel 10 to 1; another rubber which looks and feels like human skin; another rubber which will flex indefinitely without breaking; another so soft yet strong it absorbs the vibra-

tion and sound of heavy machinery. All the skill and experience gained in perfecting these specialized compounds go into every product bearing the Goodrich name, from belts to hose, tanks to tires—to make them better values. The B. F. Goodrich Company, Mechanical Rubber Goods Division, Akron, Ohio.

**Goodrich**  
ALL *products* *problems* IN RUBBER

The Absolute utmost in  
**WIRE ROPE** *Quality*

**WILLIAMSPORT**  
PURPLE STRAND  
**"Form-Set"**  
THE TRADE NAME FOR WILLIAMSPORTS PREFORMED WIRE ROPE



Here is the toughest, most fatigue-resisting wire combined with the most minute and exacting fabrication plus precision preforming.

Capable of rendering longer and better service.

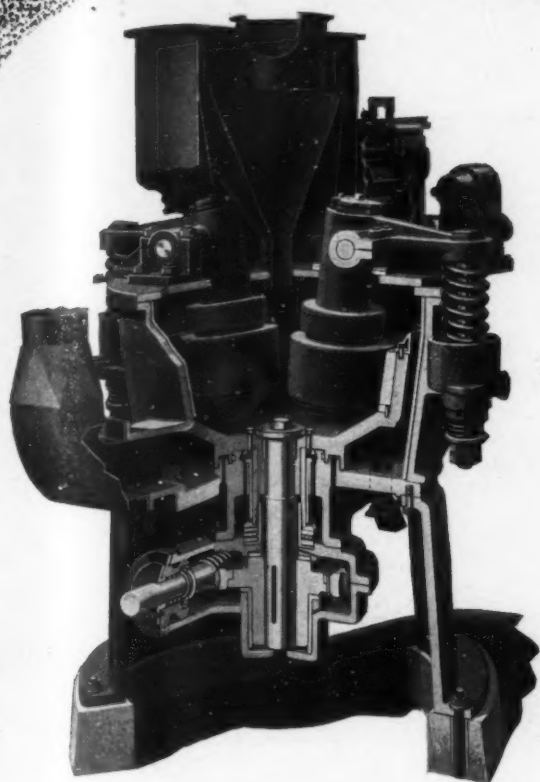
Send for catalog and prices.

**WILLIAMSPORT WIRE ROPE CO.**

WILLIAMSPORT, PA.

122 So. Michigan Ave., CHICAGO, ILL.  
Other Offices in All Principal Cities

# BOWL MILL *Economy*



## for Direct Firing and Finish Grinding

THERE'S proof in performance—and the widespread success of the Bowl Mill is confirmed by operating records from Raymond installations on direct-fired rotary lime kilns and cement kilns.

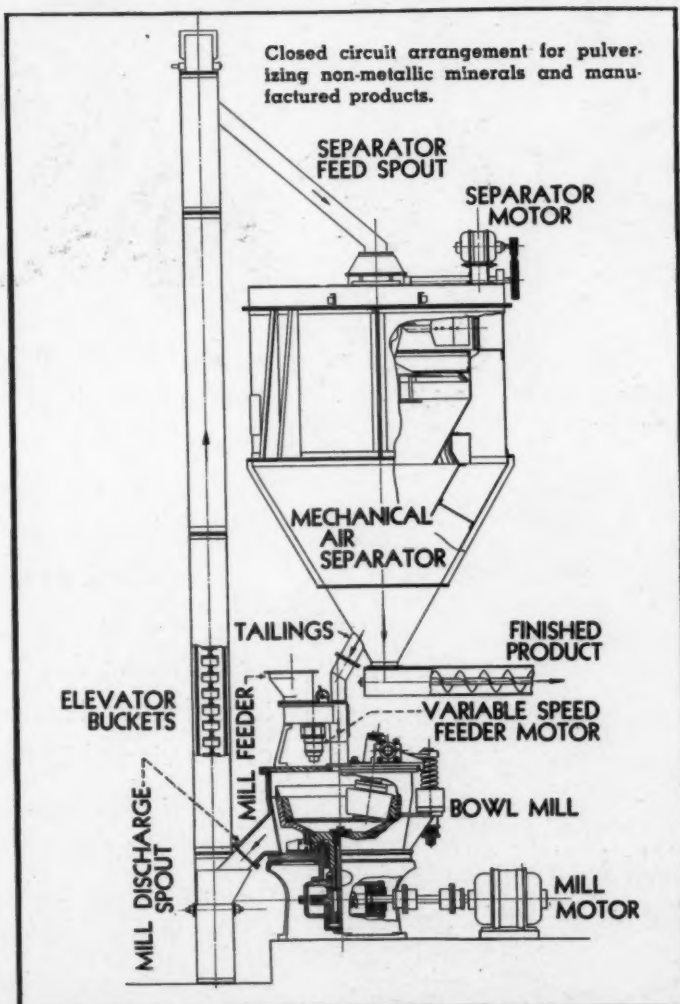
One plant reports an increase in lime-to-coal ratio from  $2\frac{1}{4}$ : 1 up to more than 3: 1 while using cheaper grades of coal.

Another finds that total savings will pay for the installation in the first six months. Other leading operators are able to show impressive figures on:

*Reduction in fuel consumption  
Lower grades of coal utilized  
Important savings in power  
Record low maintenance cost*

The proven economy of the Bowl Mill also applies to general purpose grinding operations in closed circuit with the Raymond Mechanical Air Separator, as shown in the diagram.

*Write for Bowl Mill bulletin*



# RAYMOND

**BROS. IMPACT PULVERIZER CO.**

Division of Combustion Engineering Company, Inc.

1307 North Branch Street

CHICAGO, ILL.

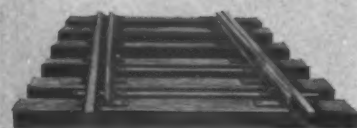
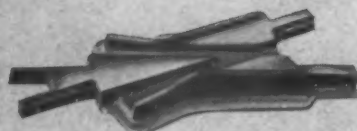
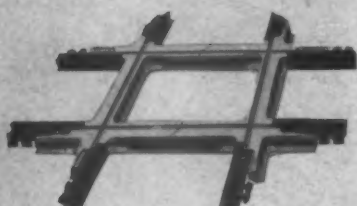
Sales Offices in all Principal Cities

Canadian Representative:

Combustion Engineering Corporation, Ltd., Montreal

# WHARTON SOLID MANGANESE TRACKWORK

## for Mines and Quarries



### TISCO Products For Mines, Quarries and Cement Plants

Manganese and Alloy  
Steel Wearing Parts

Dredge Buckets  
(riveted and rivetless types)

Power Shovel Parts

Dippers, Dipper Teeth

Pulverizer and Crusher  
Parts

Manganese Screens and  
Screen Cloth

Grinding Balls

Welding Rod, etc.



TISCO makes trackwork, too; being a foremost supplier of frogs, switches and crossings for mines, cement plants and quarries...all made of the dependable TISCO manganese steel with which you are so familiar.

You will find two definite advantages in specifying Tisco WHARTON trackwork for every need. First, is the long wear and economy provided by sound track design, and by the substantial wear-resisting sections of TISCO Manganese Steel. Second, is the additional economy provided by trackwork that is readily welded... the life of which can be extended many times by a simple welding procedure. In this respect, the combination of TISCO Manganese Steel and TISCO TIMANG Welding Rod, has no equal.

And Tisco WHARTON trackwork is inexpensive, since patterns and designs are available to meet any requirement. Full data on WHARTON weldable trackwork and all other TISCO Manganese Steel products gladly sent on request.

### TAYLOR-WHARTON IRON AND STEEL CO.

HIGH BRIDGE, NEW JERSEY

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# KOEHRING



Two, of a fleet of Koehring  
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work on a Mississippi River  
dam construction project.



Seconds saved with every hoist  
and swing—more material handled  
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ing time is reduced to a minimum  
with high speed Koehring Cranes  
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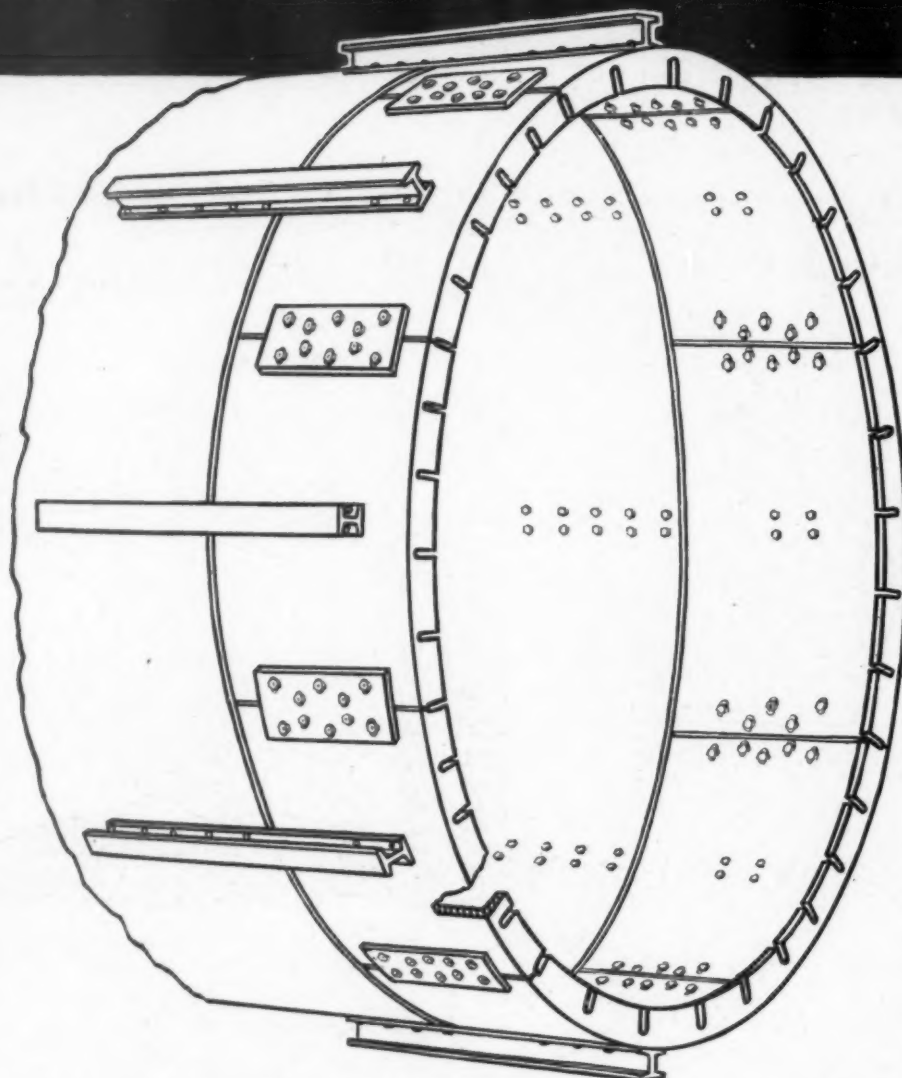
*Own a Koehring and do it faster!*

## KOEHRING COMPANY

Pavers · Mixers · Shovels · Cranes · Draglines · Dumpers · Mud-Jacks  
3026 WEST CONCORDIA AVENUE, MILWAUKEE, WISCONSIN

# AMSCO ALLOY KILN END NOSE RINGS

(PATENT  
APPLIED FOR)



The AMSCO Alloy Kiln End Nose Ring is a new, yet field-tried, specially designed segment ring for use in all sizes and types of rotary kilns!

Its design provides for the elimination of damage to kiln brick and end linings formerly caused by warpage and distortion of solid end rings.

As illustrated, the AMSCO Kiln End Ring consists of eight AMSCO Alloy segments, each made with ample expansion and contraction space on the seal lip, and held together by butt straps bolted on through slotted holes to eliminate twisting.

The whole assembly is supported from the main kiln shell by means of rigid "I" Beams.

AMSCO Alloy, completely resistant to the extreme temperatures and the corrosive action of sulphur gases developed in the burning operation, enables these units to effect worthwhile production economies, saving time, labor, and maintenance costs.

Plant operators are invited to write for complete details on AMSCO Alloy Kiln End Nose Rings. We suggest that you send detailed blue prints of your kiln ends when requesting quotation.

No bending, warping, cracking, or scaling!

No destruction of brick or kiln wall lining!

The segment design — plus the unusual heat and corrosion resistance of AMSCO Alloy — solves the problem!

Made for every size of kiln.

## AMERICAN MANGANESE STEEL COMPANY

Division of American Brake Shoe & Foundry Company

377 East 14th Street, Chicago Heights, Ill.

Foundries at Chicago Heights, Ill.; New Castle, Del.; Denver, Colo.; Oakland, Calif.; Los Angeles, Calif. • Offices in Principal Cities

# AMSCO

TRADE MARK REGISTERED

# CLEVELAND WDA-10 DOING ITS PART

# ON A BIG JOB



The Waldo approach to the Golden Gate Bridge, now being built through the hills of Marin County by Macco Construction Company, is one of the largest cut-and-fill jobs on record in the State of California. Connecting San Francisco, by way of this magnificent bridge, now nearing completion, with the Redwood Highway to the north, the full importance of the Waldo Approach Road will not be realized by the public till traffic begins to flow over this essential new connecting link.

A really big job it is—and Cleveland is proud of the selection of the WDA-10 for such service. The ground is shattered and loose, but many formations are too hard for the shovels to handle without blasting. It is tough drilling, with this loose stuff falling in behind the bits

—but the Cleveland is built for tough conditions. Its powerful hole-blowing device and strong rotation carry the drill bits through and leave clean holes the full depth.

If you have rock to excavate, you will want to know what a Cleveland Drill Rig will do on your own job. Our representatives and distributors will cooperate. Bulletins 109 and 111 on request.

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## THE CLEVELAND ROCK DRILL CO.

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Cable Address. "ROCKDRILL"

## LEADERS IN DRILLING EQUIPMENT

# *The* **VANDERWERP RECUPERATOR**



*for*  
**Rotary Kilns**

**T**HE VANDERWERP RECUPERATOR is the simplest and most efficient means of accomplishing the initial cooling of the clinker, with maximum heat recovery and full benefits in quality due to rapid air quenching.

The installation requires no alterations to existing structures, firing-hoods, or auxiliary equipment; excavations and foundations are unnecessary.

Space limitations in the kiln room in no case preclude the installation of Recuperators.

10-Ft. Cement Kiln Installation of Type CI Short-Plate Recuperator

Our new Type CI SHORT-PLATE RECUPERATOR, while departing in no way from the simplicity and soundness of design which characterizes our earlier units, embodies certain refinements in detail and provides even greater flexibility in operation.

It insures:

- Improved Quality of Cement
- Better Grindability of Clinker
- Maximum Fuel Economy
- Highest Efficiency of Heat Recovery
- Low Maintenance Cost

Kiln operators interested in obtaining the maximum benefits from air quenching and heat recovery—with proven equipment—are requested to write, without obligation, for full particulars.

## **MANITOWOC ENGINEERING WORKS**

Division of  
**Manitowoc Ship Building Corporation**

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**T**HE most exacting basis for judging wire rope performance is AVERAGE SERVICE.

This is the basis advocated by Roebling, in which rope cost per ton of material handled, or per other unit of service measurement, is based not on the service of a single rope but on the average service of several ropes.

John A. Roebling's Sons Co.,  
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*Roebling...*  
*The pacemaker in*  
*wire rope development*



# ...30 holes go up and two months come down

At the Herzog Lime and Stone Company in Forest, Ohio, Cordeau-Bickford enabled engineers to simplify quarrying procedure to the end that approximately one day in every two months is required for loading and shooting holes. Naturally this makes for efficiency and lowered costs.

Such simplified procedure is possible only when all factors involved work in perfect harmony. Cordeau-Bickford cooperates in many distinct ways: it simplifies loading; it reduces hazard because Cordeau is insensitive to ordinary shocks and must be detonated; it offers greater explosive efficiency because every cartridge is detonated directly by Cordeau; and last but not least it allows fewer but bigger shots. Cordeau not only detonates each hole but connects all holes.

Planned rotation secured by Cordeau permits split second relief of burden so every pound of explosive used may work to the best advantage.

Cordeau-Bickford Detonating Fuse is manufactured with the same precision that has made Ensign-Bickford Safety Fuse famous for more than 100 years. Let us send you a copy of our Centennial Book—and tell you more about Cordeau.



CB-55

**The ENSIGN-BICKFORD COMPANY, Simsbury, Connecticut**  
SAFETY FUSE Since 1836 • CORDEAU-BICKFORD DETONATING FUSE

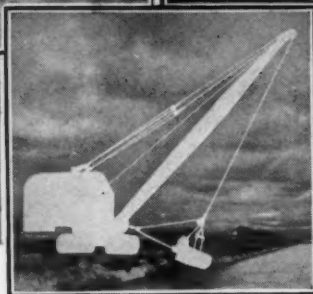
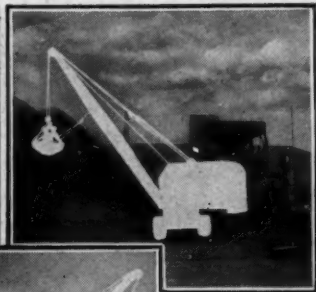
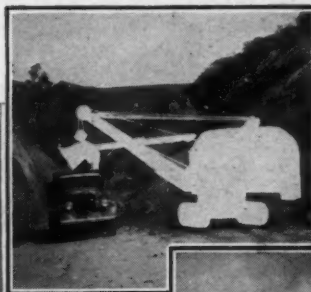
# HARNISCHFEGER

*Announces A New* **PACEMAKER**

## MODEL 355

**3/4**  
YD.

**"GOES IN FOR BIGGER PROFITS"**



Diesel or gas power. Converts as shovel, dragline, crane, trench hoe, skimmer, scoop or pile driver. Simplified alloy steel attachments give you easy change-over — cost less.

**AN ALL-PURPOSE EXCAVATOR WITH FOUR NEW "FIRSTS"**

● It's more than a new model — this 355! It's the 1936 version of digging — *much faster* because new engineering ideas, new alloy steels, new arc welded construction make it lighter, stronger, easier to run. For the first time on any 3/4-yd. machine it gives you *all* of these:

- ① Tractor-type crawlers.
- ② All-welded frame of high tensile steels.
- ③ Smooth-running helical gears in all hoist mechanism.
- ④ Live roller circle with hook rollers for easy swing without tipping strains.

Here's the profitable pacemaking performance that gets things done in a hurry—trims your bids on a wider variety of jobs—gets more jobs. Moderate purchase price lowers your investment in equipment.

**HARNISCHFEGER CORPORATION**

4465 W. National Ave.      Established 1884      Milwaukee, Wis.

A post card will bring full information. Ask for your copy of Bulletin X-10.



# **P&H PACEMAKERS - FASTER ON THE JOB**

# BUCYRUS - ERIE

*T*HIS 2½-yard shovel is built to meet the requirements of high-speed output in rock and ore. The 85-B carries no excess weight; power is used for digging and not wasted on deadweight. In every part of the cycle, the 85-B has all the speed that the operator can use and, with the new, simple, positive, electrical control that responds instantly and accurately, the operator can use more speed than he has ever been able to use before. Investigate the modern performance and economy of the 85-B!



The massive strength and minimum weight of this 85-B counts for steady output in this New York quarry.

**BUCYRUS  
ERIE**

EXCAVATING, DRILLING, AND MATERIAL HANDLING  
EQUIPMENT... SOUTH MILWAUKEE, WISCONSIN, U. S. A.

# Tested and Approved for HEAVY DUTY



Only when wire comes within the narrow tolerance of our rigid specifications, is it permitted to go into any Broderick & Bascom Wire Rope.

The qualifications for use in Yellow Strand are particularly high because this celebrated rope is intended for duty where conditions are unusually severe.

"Flex-Set" Preformed Yellow Strand is made of this same high quality wire.

The difference is this: each strand is pre-shaped to the helical form it will maintain in the finished rope.

Result: a rope that is virtually pre-broken in, flexible, easy to handle and install, with little tendency to kink or fatigue.

For long, satisfactory, economical service, use "Flex-Set" Preformed Yellow Strand.

**Broderick & Bascom Rope Co.**  
St. Louis

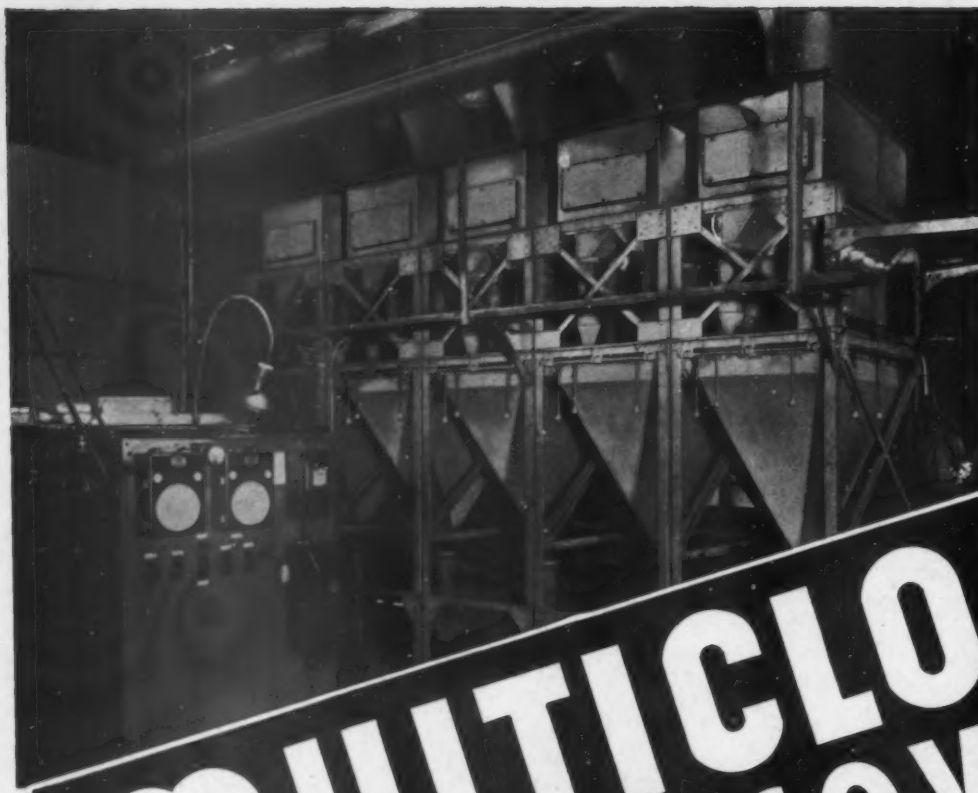
Factories: St. Louis - Seattle - Peoria

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## "Flex-Set" Preformed YELLOW STRAND



Multiclones collect process dusts consisting of extremely fine particles. The recovery of dusts that have commercial value soon pays for an adequate Multiclone installation. Illustration shows a battery of Multiclone units delivering a product ready for packaging.



# MULTICLONE DUST RECOVERY

Objectionable dusts dispersed in waste gases are efficiently collected by Multiclones and prevented from contaminating the atmosphere. All metal construction enables Multiclones to handle hot gases.



## FOR ALL KINDS OF DUST OR POWDER

Dusts in waste gases—dusts as end products or by-products of processing—dusts in hot or cold gases—moist or dry—all are collected at minimum cost by Multiclones. Multiclones are simple and compact. Small tube construction increases centrifugal action and reduces power and space

requirements. Fireproof and weatherproof, Multiclones can often be installed in locations that are useless for other purposes. They are made in units that can be multiplied to any desired capacity and installed by ordinary factory labor.

*Send for New Descriptive Bulletin*

### WESTERN PRECIPITATION COMPANY

1016 W. Ninth St., Los Angeles, Calif. • 405 Lexington Ave., New York  
Specialists in Dust and Fume Control for a Quarter of a Century. Makers of Cottrell Electrical Precipitators and Various Types of Dust Collectors.

# FULLER-KINYON

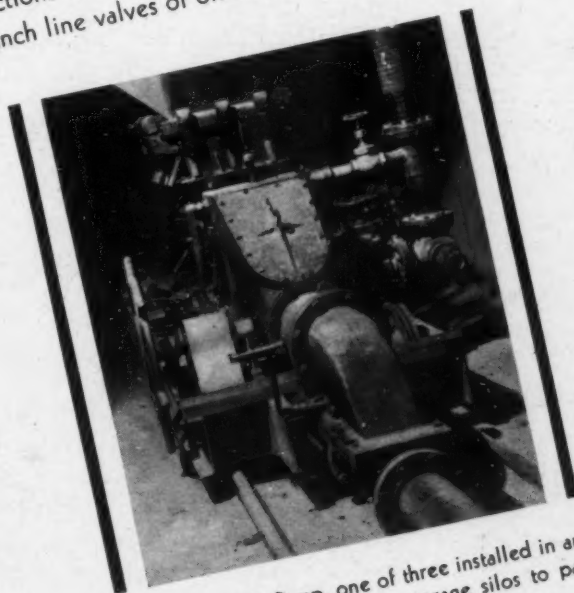
## Speed and Economy when Conveying Pulverized Materials

MODERN shipping and delivery demands are met with Fuller-Kinyon Portable Pumps. Prompt transfer of cement can be made to car and truck packers, and in bulk to cars, trucks, and boats. Standard, special, and tested cements can be handled quickly without contamination.

Portable pumping systems, under automatic and remote control of the branch line valves, require a minimum of attention, even though distribution problems are complicated by scattered receiving points.

Further advantages are: one system, with one drive to convey, elevate, and distribute to all points; blending and transferring of cement to and from all bins by means of simple piping layout; freedom from danger to workmen; cleanliness and convenience.

Fuller-Kinyon Portable Pumping Systems, for withdrawing cement and other pulverized materials from silos, are furnished complete and ready for erection; silo discharge spouts, rotary gate valves, transport line and diverting valves, bin connections and complete automatic and remote control panels for operating the branch line valves of one or more systems.



Fuller-Kinyon Portable Pump, one of three installed in an Eastern cement plant, pumping cement from storage silos to packhouse.

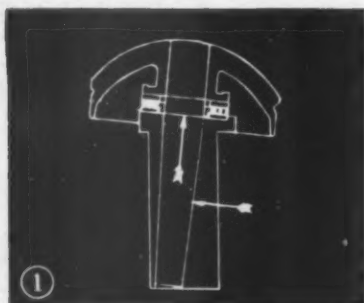
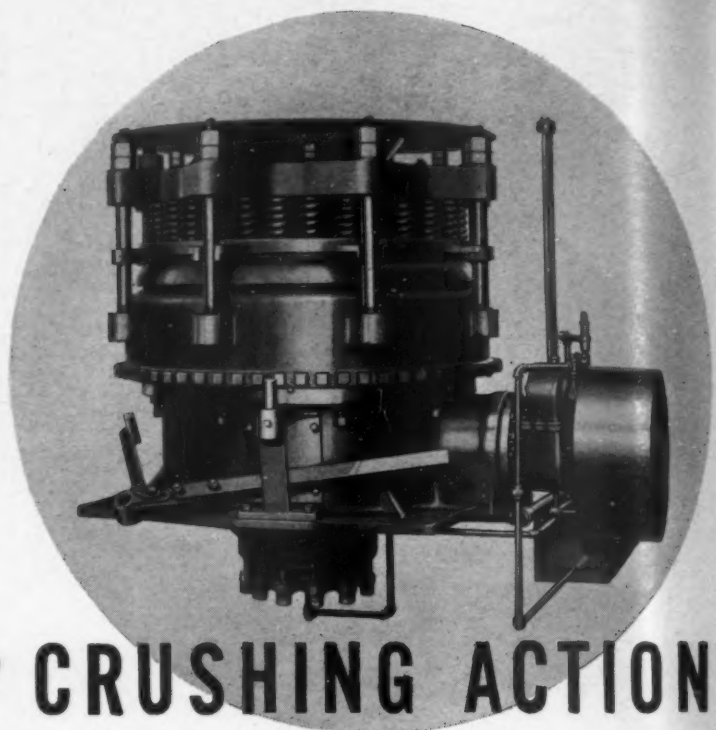
**FULLER COMPANY**  
CATASAUQUA, PENNSYLVANIA

Chicago: 1118 Marquette Bldg.  
San Francisco: 320-321 Chancery Bldg.

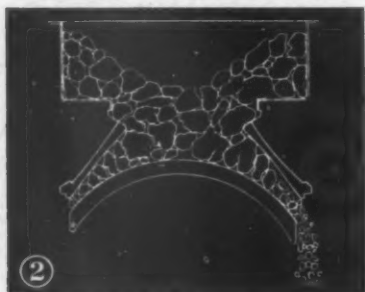
P-9

There's only **ONE**  
SECONDARY CRUSHER  
that has the . . . . .

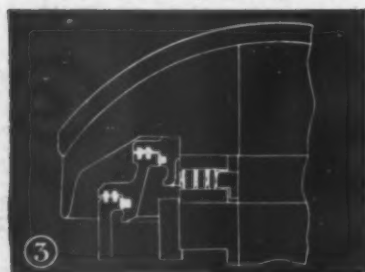
# Double Wedge CRUSHING ACTION



**DOUBLE WEDGE ACTION**



**CHOKES FEED**



**PISTON RING SEALS**

Why will you get more years of low up-keep service . . . as well as a finer, more cubical product . . . with the Telsmith Gyrasphere?

**1** Because the Gyrasphere's crushing action is unique. The head is impelled both by the gyrated shaft and a rotary wedge action, produced by the supporting eccentric and roller thrust bearing. *These two forces cooperate to produce the most effective breaking action developed in any crushing device.* The bronze eccentric sleeves are relieved of most of the load — pressures being diverted downward to the massive end thrust bearings which wear evenly and last indefinitely.

**2** Because the Gyrasphere takes an unregulated and unlimited *choke feed*, when other secondary crushers can't . . . Telsmith Gyrasphere turns out greater tonnage and a more cubical product.

**3** Because oil leakage is effectively prevented while grit and water are absolutely excluded by unique protective means — four flexible leather labyrinth seals plus two piston rings. *These double protectors reduce both oil consumption and maintenance expense to a minimum unattainable in other crushers. Write for Bulletin Y-11.*

**SMITH ENGINEERING WORKS**  
508 E. CAPITOL DRIVE MILWAUKEE, WIS.

Associates in Canada: Canadian Ingersoll-Rand Co., Ltd. Montreal, Toronto, Winnipeg, Vancouver

Y-9

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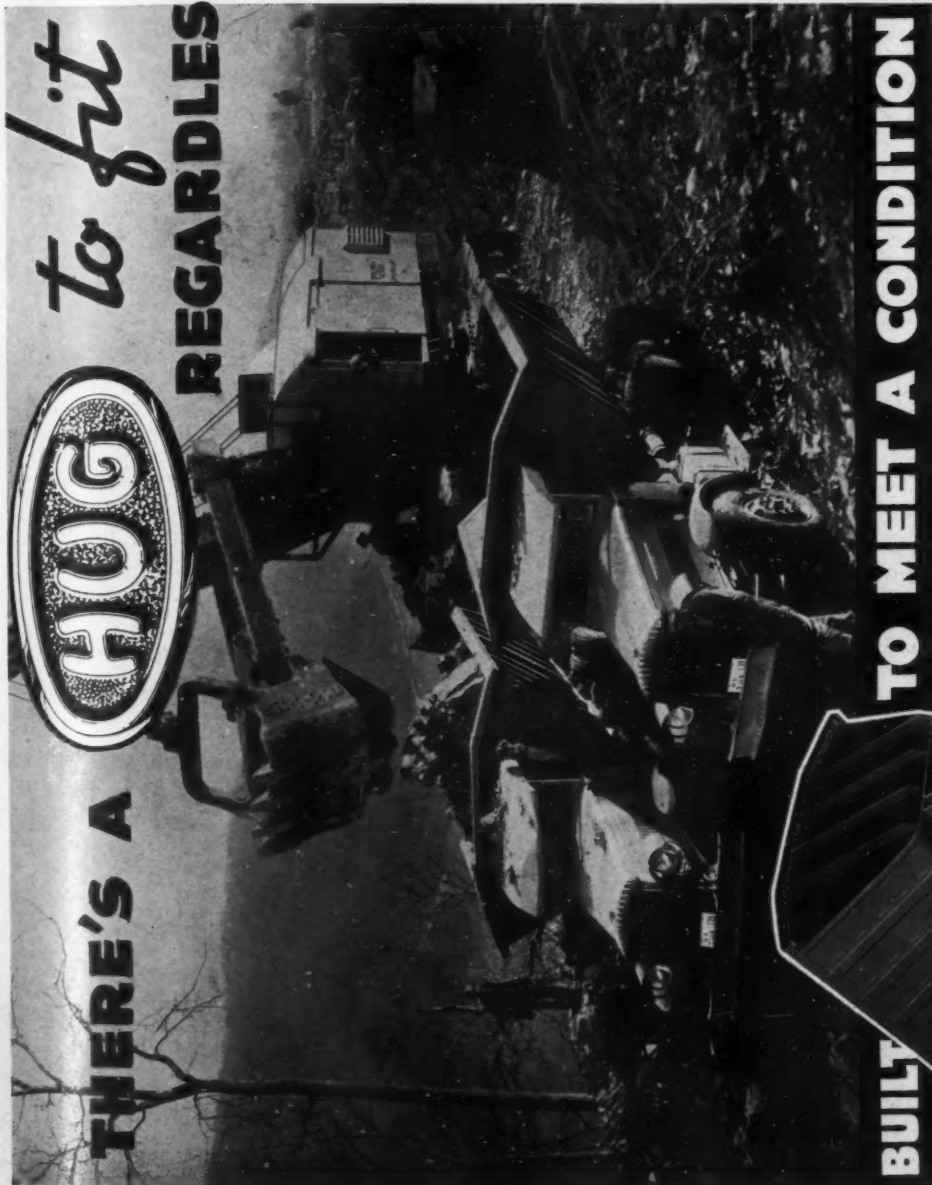
# TELSMITH GYRASPHERE

**THERE'S A**

**HUG**

*to fit*

**REGARDLESS OF CONDITIONS!**



**BUILT TO MEET A CONDITION**

● One of six Model 99 Hug Quarry Specials operated by Tennessee Valley Authority projects.  
The Model 99 Hug Quarry Special is available in 10 rock body—special quarry or rectangular excavation body. Write for detailed specifications and descriptive literature.



- This HUG Giant — the Model 99 Quarry Special is especially designed for quarry operations; capable of carrying payloads of 40,000 lbs., these Hug Giants have demonstrated their superiority on job after job where conditions made it seem almost impossible for any equipment to operate, and any equipment not built especially for the job could not operate successfully.

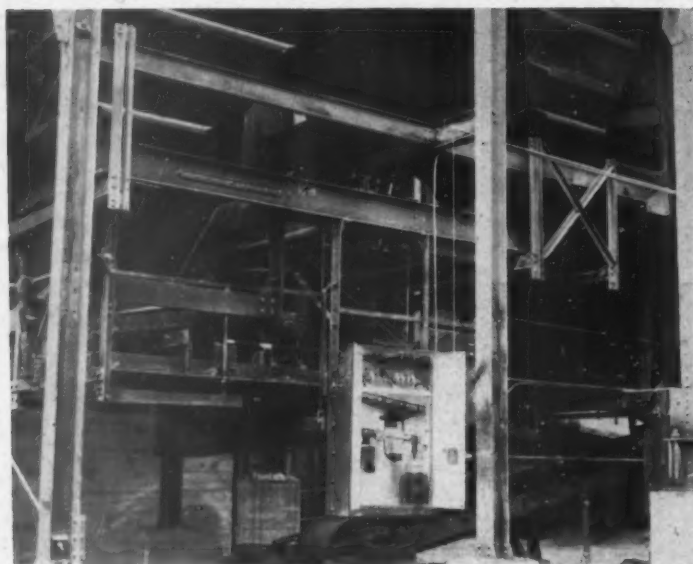
The Hug Model 99 is the result of years of experience by Hug engineers in successfully building trucks to meet special conditions. Such features as the Hug special alloy steel I-beam frame, the Buda heavy duty 6 cylinder truck engine, the dual drive double reduction full floating type rear axle, 12 speeds forward, 3 speeds reverse transmission, setback wheel design with resultant equalized load distribution—all these features combined with Hug construction make possible the outstanding performance of the Model 99 Hug Quarry Special.

In addition to the famous Model 99 Quarry Special, Hug offers a complete range of chassis equipped with bodies ranging from 3 to 12 yards.

Write for detailed specifications and descriptive literature.

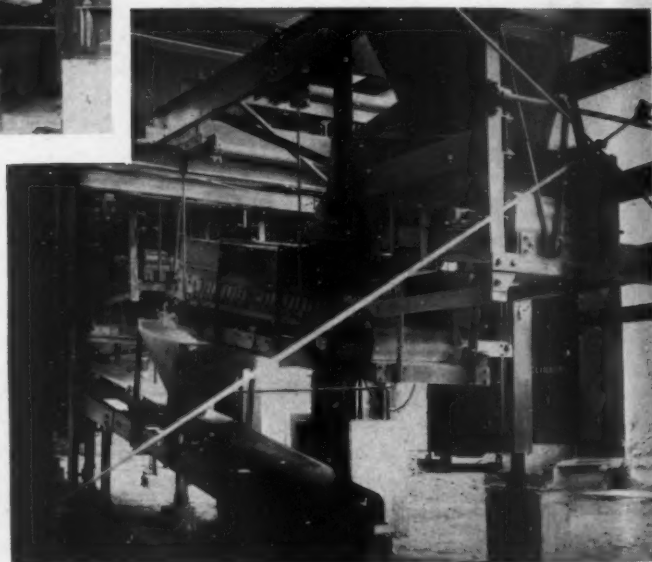
**THE HUG COMPANY**  
502 CYPRESS ST., HIGHLAND, ILL.

# RICHARDSON CONVEY-O-WEIGHS AT LOUISVILLE CEMENT COMPANY



FOUR Richardson Convey-o-Weighs were installed in the Speed, Ind., plant of the Louisville Cement Company of Louisville, Ky., to form an important part of that company's recent plant modernization. The scales are accurately proportioning the shale and limestone, clinker and gypsum. They are contributing to increased profits.

These machines weigh and record, delivering the materials in an even and quiet stream, with dust reduced to a minimum. Because of their simplicity of design and unusually sturdy construction, maintenance costs are practically nothing; they were built for many years of this hard service.



You too can profit by installing Richardson Convey-o-Weighs in your plant—for proportioning any two or more ingredients such as limestone and shale, limestone and coke, clinker and gypsum, etc. They may also be used for weighing any single material as received, as processed, as fired to or discharged from kilns, to storage or in shipment.

ACCURATE WEIGHTS MEAN POSITIVE CONTROL OF MATERIALS AND COSTS

*Write for copy of new Catalog 4236R just issued. It describes and illustrates the complete line of Richardson Automatic Scales for Bulk Weighing.*

## RICHARDSON SCALE COMPANY

CLIFTON, N. J.

NEW YORK MINNEAPOLIS CHICAGO OMAHA LOS ANGELES BOSTON  
SYRACUSE ATLANTA PHILADELPHIA WICHITA CLEVELAND  
AGENTS FOR EASTERN CANADA: MESSRS. PEACOCK BROTHERS, LTD., MONTREAL & TORONTO

# If your shovel could talk...

**BLAST THE ROCK  
BETTER AND  
I'LL PICK IT UP  
CHEAPER!**

**B**ETTER blasting means full buckets. And full buckets have a lot to do with *full profits!*

Proper fragmentation — economical breakage — results from control of explosives' force. Electric Blasting provides flexibility in control—that is further increased by the use of the Atlas Twin Fifty Blasting Machine—an important advance in the application of Electric Blasting.

Used with two leading wires, the Twin Fifty Blasting Machine fires a single series of 50 Electric Blasting Caps. Used with *three* it fires a *first* and a *second* series of 50 caps each—with an interval of *only a few thousandths of a second* between—at a single stroke of the rackbar!

The slight interval between the firing of the two series is important in controlling the action of explosives to reduce troublesome back break in quarries, lessen pulverization—and thereby *improve fragmentation.*

Give yourself—and your shovel—a *break* on rock breakage with the Atlas Twin Fifty Blasting Machine.



**ATLAS POWDER COMPANY, WILMINGTON, DEL.**

Cable Address—Atpowco

*Everything for Blasting*

#### OFFICES

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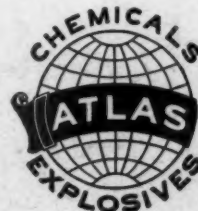
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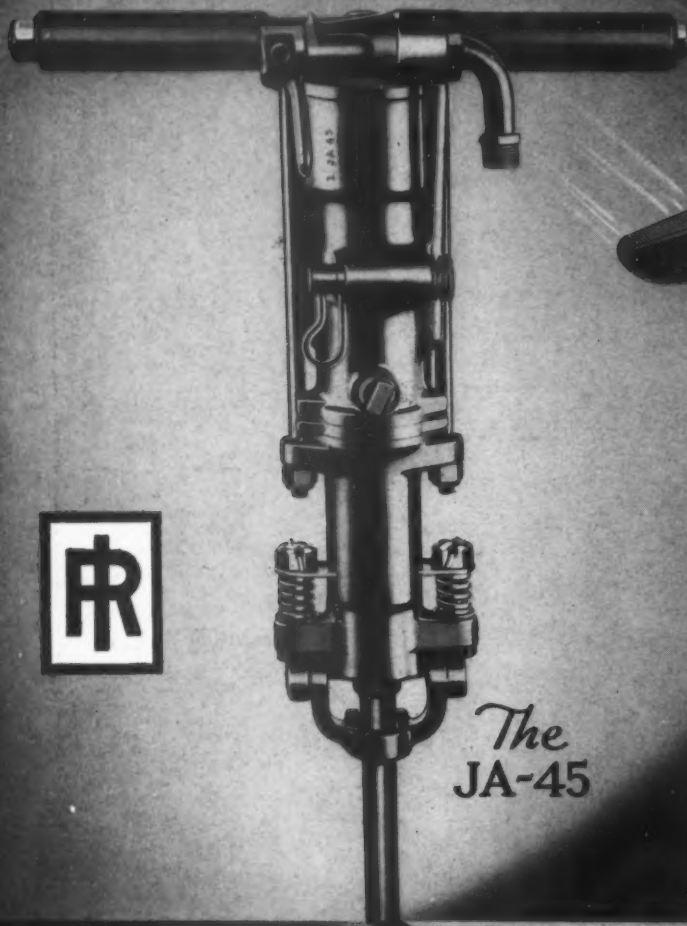
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**ATLAS**  
EXPLOSIVES



# **CUT TIME AND COSTS** *with* *this NEW* **JACKHAMER**



*The*  
**JA-45**



## **DRILLS FASTER USES LESS AIR**

You can get  $\frac{1}{3}$  more drilling from your compressors by using JA-45 Jackhamers. They drill faster than other drills in the same weight class and use considerably less air. If your present drills pull down the air pressure, try JA-45 Jackhamers, and watch the air pressure stay up.

The JA-45 can be furnished in dry, wet, and blower styles. It weighs approximately 45 lbs., and its length is about 21 inches.

Write for Bulletin No. 2266.

# **Ingersoll-Rand**

11 Broadway New York

Branches or distributors in principal cities the world over

# Rock Products

With which is  
Incorporated

CEMENT *and* ENGINEERING  
NEWS

Founded  
1896

Volume XXXIX

Chicago, August, 1936

No. 8

## Criticism or Action?

THE OBJECT of both PWA and WPA is to furnish employment to men who would otherwise be idle. Unfortunately WPA was placed in the hands of men chiefly conspicuous as welfare or charity exponents, of no business experience or ability, apparently, who are obsessed by a paternalistic, philanthropic complex. Consequently, much that WPA has attempted to do has been subject to much ridicule and condemnation.

An example is the picture below, which has been widely published in the pictorial sections of the metropolitan newspapers. We hold no brief for WPA; we, too, have frequently noted the folly and wastefulness of many of its projects. But, we think the picture below is as much a reflection on the contractor as on the WPA.

### *Resourcefulness on Part of Employer?*

Certainly, with a little resourcefulness, the contractor could have found something halfway useful for the men to have done, instead of subjecting them to public humiliation and ridicule by carrying pebbles, one at a time, in buckets. From the looks of the job, he could have utilized that time to some advantage in trimming up the slopes,

or otherwise adding to its aesthetic features, if not its serviceability.

Some years ago (we don't know whether it is the practice now or not) the Southern Pacific Coast Lines used to ballast their tracks with crushed stone, in such a way that the outside edge of the ballast, or row of stone, was placed by hand—giving straight, true lines on the road-bed, like a mosaic pavement. One could sit on the observation platform of a train and actually enjoy looking at this beautifully ballasted track.

### *Pride of Workmanship Upheld*

Probably labor was relatively cheap, but even so, to some, perhaps, this was prettying up a railway track beyond the requirements. It never seemed so to us; we could imagine the genuine joy of Mexican track laborers (who have a real sense of the artistic) in the results of their handiwork; we could sense the pride of the section boss and the roadmaster in the splendid appearance of their tracks; and we believe it was good advertising for the Southern Pacific Lines.

Something like that is what we mean by putting in the

*The picture below is of a WPA project near Afton, Okla., where the contractor finished his job without having used the requisite number of man-hours, so he employed the men to carry a pebble or two in buckets until the allowance was used up*



Acme Photo

extra time required on this WPA bridge job on aesthetic treatment rather than in ridiculous stuff like that illustrated. It seems to us that the contractor, for lack of imagination (or perhaps for some ulterior motive) passed up an opportunity to make his job something that would have given him a reputation; and he deprived the workmen of something which would have given them a pride in a workmanship, that every man has, although it may be latent.

#### ***Here Is a Resourceful Contractor***

If you turn from this picture to the following pages you will find that a contractor with resourcefulness and ingenuity did find a way to employ relief labor usefully. Moreover, by doing this, he discovered a way to sell his crushed stone, to give farmers what they have always longed for—a hard road right up to their farm entrances, no matter where their farms were—and to do all these largely with federal relief money. Were there more producers equally resourceful, we probably would have far more of the federal money spent through PWA on legitimate contract jobs.

#### ***Whose Job Is It?***

It is easy for all of us to be critical. We can sit in our office chairs and do that. It takes effort and hard work to do something constructive; yet it is as much our job to find or make jobs, as it is the government's; for in the last analysis, according to our American theory, we *are* the government—"a government of the people, for the people, by the people." Also, we pride ourselves on knowing more about industry than the politicians who run the government.

Whichever way the election may go, we shall still have an unemployment problem. We may hope that a new administration, or a new congress, or both, will lend a more sympathetic ear to practical suggestions from men of industry; but even then, more than advice is needed. Men of business and industry, employers of all kinds, ought to be practical enough to get together and use their combined faculties to devise ways and means of getting something useful for the combined mortgages they are placing on their present and future incomes through these tremendous government expenditures.

#### ***We Want Public Works Continued***

Generally speaking, our rock products industries, at least, want a continuance of public works—anyway, until there is evidence that private construction will take up some of the slack; they object strenuously and justly to the government's duplication of production facilities, and to doing by day labor what can be done much more effectively by contract. But where have those most interested gone so far as to organize all the business men in their localities to get these wrongs righted? Where have they come forward with specific projects so detailed as to demonstrate that directly and indirectly they can absorb all the local unemployed that WPA has on its payrolls?

There has been a lot of talk about the industries absorbing unemployed labor if the government would give the industries a chance, but is industry so organized and

coöperating effectively that it can prove its ability to do this? We have heard and read much but we have seen nothing in the way of a specific and comprehensive plan to create private employment as a result of government spending for public works. The Department of Labor and the U. S. Bureau of Public Roads have made feeble advances in this direction, but it is not their job so much as it is industry's.

#### ***Never Greater Need for Trade Associations***

Many trade and industrial associations are experiencing hard sledding from lack of financial support from their industries. It is incomprehensible how members of any industry can be so indifferent to so great an opportunity and so great and pressing a responsibility. For the time being, at least, public works construction will have to absorb as much of the surplus labor as possible, but through such public works, if properly done in a business-like way, sooner or later *every industry* will derive stimulation. Therefore, men interested in all branches of the construction industry could well take the lead, but they should be able to obtain the assistance of business men in all lines of activity also, from motives of self-interest, if no other.

Perhaps this kind of a movement could best be built up from local organizations, although effective leadership at the top would be of immense help. If labor unions are able to exert so effective an influence with government, with a few million members, what could not a few million effectively organized business men and employers accomplish, in a cause in which every one has a vital interest?

#### ***Great Movements from Small Beginnings***

Of course it looks like a gigantic task, and it is one. But great movements start from small beginnings. If Grandpa Townsend, Father Coughlin and others who might be mentioned, can start great national movements on harebrained schemes, why cannot an organization of employers soundly designed to create jobs find a following? Why cannot the movement be started in small communities by gathering together every employer of eight or more people to serve as local committees on employment? Subcommittees could be appointed for each industry represented. Either the committee or the subcommittees could organize on a national scale, or they could most profitably use the national associations of the various industries.

Our suggestions may be "all wet"; may be considered visionary and impractical, etc. But we are seriously disturbed, as we think other thoughtful citizens must be, by recent meetings of representative business men and employers because of an apparent attitude of apathy toward problems that really and truly are theirs, if they hope to retain their places at the head of American industry. Probably most of them fully realize that government can never solve this unemployment problem; but an attitude of "let George do it" will not solve the problem either; nor will the national election in November. But they can be of immense help in solving it if they have the will and all put their shoulders to the wheel.

## Upholds Code Tax

Wisconsin State Supreme Court recently sustained the assessment provision of the 1935 state recovery act. Under that law ten codes of fair competition are operating. The decision was six to one, Justice Edward T. Fairchild dissenting.

In effect, the entire act was at stake, since the trade practice commission, administering agency for the codes, would collapse without the right to assess fees. The controversy went directly to the high court on petition of the commission after the Wisconsin Contractors, Inc., had notified its 500 members they need not pay the assessments because they constituted an unconstitutional levy.

Without passing on validity of the law itself, the court held that the legislature was constitutionally empowered both to assess industry for its own regulation and to delegate such authority to an administrative agency.

In part, the opinion, written by Justice George B. Nelson, said:

"If the exaction [code fees] is in the aid of regulation and for the purpose of eradicating abuses, in the interests of public welfare, and bears a reasonable relation to the end sought, there can be no serious question as to the power of the legislature to impose it."

## Expanding

Monolith Portland Cement Co., Monolith, Calif., recently received a shipment of cement mill machinery, which installed, it is claimed, will make this one of the largest and most modern plants in the country. F. L. Smidth & Co. are furnishing the equipment and doing the engineering.

## Exports Increase

Phosphate Rock exports from Tampa, Fla., during the first six months of 1936 were more than the entire 12 months of 1932. Volume of exports has increased steadily since then and this year should be about a million tons.

## Adds Crusher

M. D. Powell, Arabia, Ga., owner of a granite rubble-stone quarry, has purchased a crusher, air compressor and other equipment to produce crushed stone.

## Wage Increase

Santa Cruz Portland Cement Co., Davenport, Calif., according to local news reports, made a 10% increase in the wages of all employees on an hourly basis, beginning July 1.

## Resumes Operation

Standard Materials Corp., Clinton, Ind., has resumed production after being shut down for several years.

## Interprets Government Contracts Law

SECRETARY OF LABOR PERKINS, on the advice of her legal assistants, has made an interpretation of the Walsh-Healey Government Contract Law which greatly restricts its application.

She told the press recently that the law could not be enforced beyond the immediate contractor. This means that the act cannot be used to raise wage rates in allied or supporting industries.

As an example, she explained that under the act a shovel manufacturer selling to the government would have to pay the prevailing minimum wage of his locality determined by the secretary and restrict hours of work to 40 a week for men engaged on the government contract. Other employees would not necessarily be affected.

However, the manufacturers who furnished the shovel maker with his sheet steel and his lumber would not be subject to government control.

Corporations habitually marketing their products through separate sales agencies or dealers would escape the government regulation of working conditions of their employees, although their products could still be sold to the government, a member of the Labor Department legal staff admitted.

Although it might be possible to contest the establishment of a separate corporation solely for the purpose of government bidding, it was considered doubtful that objection could be raised to such existing arrangements.

Concerns violating the law are subject to a fine and cancellation of contract without redress and, in addition, if purchase of the same goods in the open market entails extra expense, such can be charged to the contractor. They could also be put on a "black list," shutting them from any government contracts for three years.

Department attorneys said that when the secretary has determined the "prevailing minimum wage" it will be made public and can be compared by trade unions or other organizations with the wages and hours of a plant which was not bidding on government contracts, thus possibly influencing more than the companies directly affected.

A special board of three persons will be created within the Department of Labor, Miss Perkins said, to "exercise all of the quasi-judicial functions contained in the act in an advisory capacity."

## Advertisers

Medusa Portland Cement Co., Cleveland, Ohio, had a full-page advertisement in the July 21 issue of the *Cleveland Press*, celebrating the city centenary. Medusa has been in business for 45 years.

## Equipment Must Be Approved

Silicosis prevention devices to be installed under the recently enacted New York State law must be formally approved by the State Industrial Board. Commissioner Andrews recently issued a statement in part as follows:

"It is gratifying to note that employers are coöperating so thoroughly in carrying out the preventive provisions of the law that they began immediately to study dust collecting and eradicating devices and to prepare for their installation.

"Many employers have corresponded with the State Department of Labor asking for approval of devices, the installation of which they contemplated, or asking for information as to approved devices. It may be that many employers have gone ahead and begun the installation of dust-collecting and eradicating devices confident that those devices which they were installing would meet with approval.

"I would advise the dust-hazard industries generally that no devices have as yet been approved and suggest that employers make no final commitments on or acceptance of such devices until they have been definitely approved under the provisions of the law by the Industrial Board of the State Department of Labor. It might be well for employers in those industries to install such apparatus on trial, final commitment and acceptance being subject to the Industrial Board's approval of the apparatus.

"I shall be pleased to hear from all employers and employees, health authorities, engineers and others who may have practical information, advice and suggestions as to dust-collecting and eradicating machinery and methods, and place same in the hands of the Advisory Committee and the Industrial Board for their consideration."

## Installing Dust Collectors

Chemical Lime Co., Bellefonte, Penn., is installing Norblo dust collectors in its packing plant.

Missouri Portland Cement Co., St. Louis, Mo., plant, is installing Norblo dust collectors in the clinker handling department.

Louisville Cement Co., Speed, Ind., plant, is installing Norblo dust collectors in both finish and raw grinding department.

## Installing Air Separators

Alpha Portland Cement Co., Martins Creek, Penn., plant No. 4, is installing three 16-ft. Sturtevant air separators.

New York Trap Rock Co., Verplank, N. Y., plant, is installing a 14-ft. Sturtevant air separator to make agricultural limestone and other special products.

# HOW

## R. Newton McDowell

### obtained a

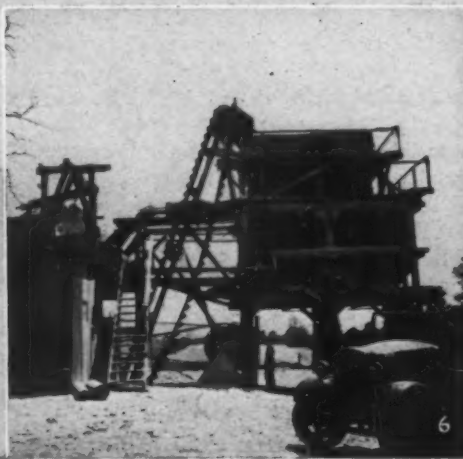
# 500,000 TON

### order for crushed stone



R. Newton McDowell (left) and his friend John Prince

**R. NEWTON McDOWELL**  
*who didn't wait for the  
 mountain to come to him.  
 Instead he blasted one and  
 sold it as crushed stone!*



(2), (3), (4) Typical local quarry operations conducted by R. Newton McDowell: Hand loading to provide specified man-hours; small dump trucks which are driven up ramps to crusher hoppers. (5), (6), (7) Typical movable crushing plants, all parts standardised



Excavation for a 36-in. pipe culvert was made in this section of the Malta Bend "road"



A clearly definable stretch of road shown at the time the Malta Bend project was completed



Before—A section of the Malta Bend road at the time road construction started

UCTS on his way to Washington, D. C. He was quite disgusted with the lack of resourcefulness of Missouri contractors, who could think of no way to spend the millions of PWA money, then being made available, save for further "improvements to navigation" in the Missouri River. He described rather sketchily an idea his fertile brain was hatching to employ *usefully* relief labor, as the government wanted done, and at the same time preserve his private business.

His scheme, quite clear now, was this: He had rediscovered, on his return to Kansas City from Fort Peck, that there is a law on the statute books of Missouri, long out-dating the state highway acts, which provides for the voluntary formation of road improvement districts, as well as of drainage districts.

Under the Relief Appropriation Act of 1935, the Public Works Administration was authorized to proceed on a new program, and the President indicated that projects to be financed in part by PWA by way of a grant, in the amount of 45% of the total cost of the project, should meet the following test:

- (1) The projects should be useful.
- (2) Projects shall be of a nature that a considerable proportion of the money spent will go into wages for labor.
- (3) Projects which promise ultimate return to the Federal Treasury of a consider-



After—The same view as shown at left but with construction of the road completed

**K**KNOWN to his friends as having a genius for promotion, R. Newton McDowell, Kansas City, Mo., unlike many producers of construction materials, did not wait to see how, when and where a government construction project might come his way. As president of the Blackwater Stone Co., and of R. Newton McDowell, Inc., contractors, he has had plenty of experience as a quarry operator and crushed stone producer. So when things got slack in Kansas City and vicinity in 1933 or thereabouts, and there was nothing but a few Missouri River improvement jobs in prospect—for which there was much competition—he bid in a contract for riprap stone for the Fort Peck dam in Montana.

Some time after that contract was completed, Mr. McDowell stopped in Chicago to visit briefly with the editor of *ROCK PROD-*

able proportion of the costs will be sought.

- (4) Funds allotted for each project should



Proper drainage structures, such as this 30-in. pipe and masonry wall, were provided for in the engineers' plans

be actually and promptly spent and not held over until later years.

- (5) In all cases projects must be of a character to give employment to those on the relief rolls.
- (6) Projects will be allocated to localities or relief areas in relation to the number of workers on relief rolls in those areas.

In addition to the 45% grant, the PWA was authorized to lend the sponsors of a project the remaining 55% of the cost for a period of twenty years, at 4% interest. In order for the sponsors to take advantage of a loan, it was necessary for them to vote bonds to the extent of the loan.

Mr. McDowell familiarized himself with the terms of this act and, putting two and

two together, decided the road improvement districts could be utilized.

#### A Good Listener

Mr. McDowell had previously sat in on a discussion of the farm mortgage problem by a small group of experts—insurance men, bankers and federal officers. He had learned that the desirability or salability of a farm in these modern days was measured by its nearness to an all-weather road. It used to be the nearness to schools and churches; but these now are secondary, for obvious reasons, if there is access to a hard road in all weathers.

Those who live in the East, or in high sections of the country, have no appreciation of what unimproved roads in Central

West river bottoms are like in rainy weather, and in the spring when the frost comes out. They simply are not "navigable" for any kind of traffic save a man on horseback. Astonishing stories are told of the primitive conditions that sometimes result from the inaccessibility of farms for weeks at a time. Dried out and smoothed out by a little traffic, these roads are very fair in dry weather.

Mr. McDowell, being familiar with his own Missouri countryside, knew that some of the richest farm land in the state was handicapped by this kind of road. State highways, country trunks, and township roads were all right so far as they went, but there still remained miles and miles of dirt road serving anywhere from one to a dozen or more farms off the main highways.

#### Elements of the Problem

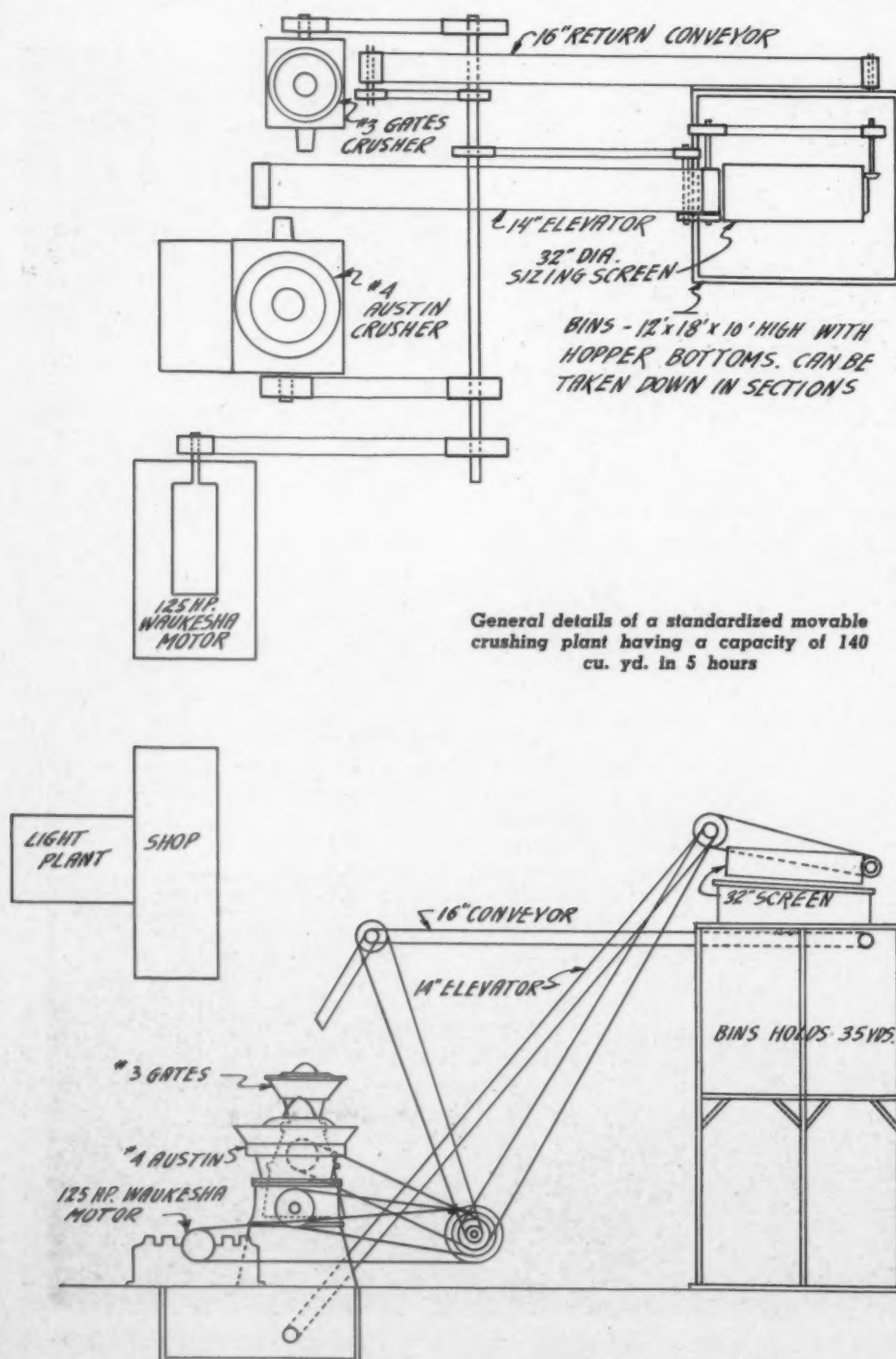
The assembled elements of the problem were: (1) a crying need for real farm roads; (2) relatively rich farmers amply able to pay for them if the price could be made commensurate with the limited service the roads were to give; (3) a pressing need to create employment; (4) millions of federal government funds available for approved public works, with special emphasis on rural development; (5) a state law which permitted any group of adjoining farms to be combined to form a road improvement district, which could issue bonds secured by the farm land itself.

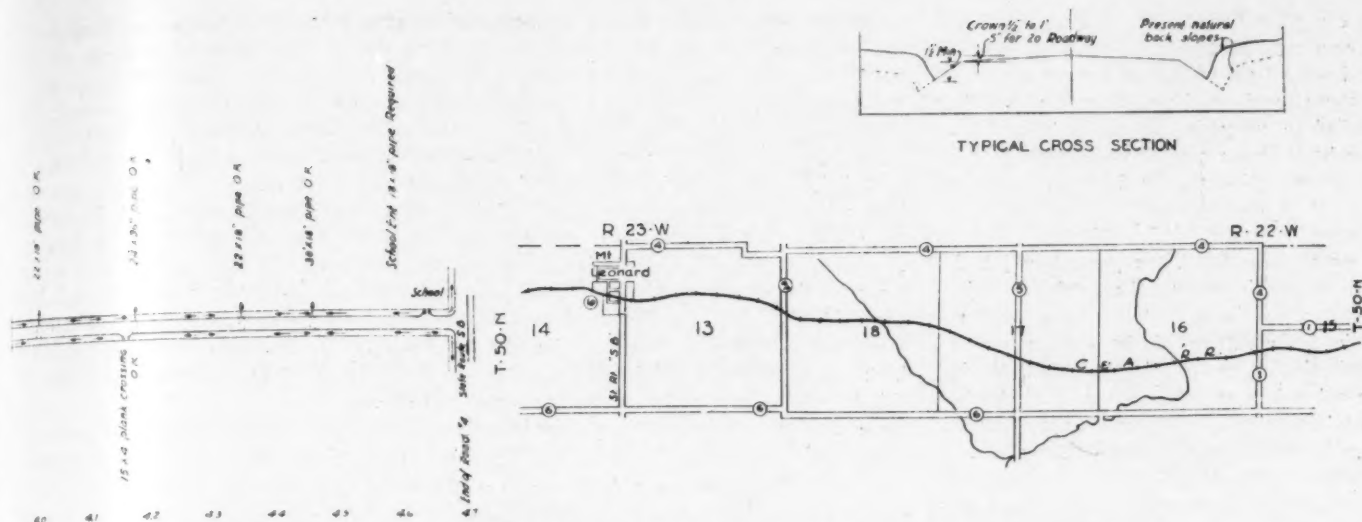
The first step to develop his program was to ascertain from the Public Works Administration, if road projects could be built under their program. A conference was held with W. M. Spann, the acting state director for Missouri, and fortunately Mr. Spann being one of the outstanding highway engineers of the middle west, was quick to realize the benefits that could be derived from low-cost roads. The only element of doubt in his mind was, whether or not projects could be placed under contract in the length of time which all PWA work had to get started, and he advised that if the sponsor of the political subdivision would employ an engineer, familiar with highway construction, to prepare the data necessary to support the application for a loan and grant, that he would consider the approval, providing the expenditure of the funds on these projects would show a large portion of the money being spent for labor, and providing that the design and specifications for the roads were in line with highway construction that would apply to low-cost road projects.

#### Finding the Right Districts

The next step was to locate a county, which would be able to finance projects, and one which had ample relief labor.

Mr. McDowell operates a large crushed stone plant near Blackwater, Mo., and of course was naturally interested in seeing projects developed in the territory where he would have at least an even-break in selling the surfacing material. With this in mind,





Sample strip map of a small portion of the Shackelford-Mt. Leonard road, showing construction details

he investigated the possibilities of a road program in Saline county, which has a rail haul from his Blackwater plant of about 15 miles. He found the county was a very rich agricultural center, and has a large assessed valuation, which naturally would permit voting of bonds at a very small increase in taxes to the individual property owners in the county. He also learned, that the county was divided into what is known as "special road districts." Special road districts are set up by the Missouri road laws, and have been in operation in Missouri for many years, however, only a few of the more aggressive commissioners of the road districts have taken advantage of the possibility of voting bonds and building roads in their districts. A road district may be 36 to 100 square miles in size, and is permitted to vote bonds up to 5% of their assessed valuation for road construction purposes.

The next step was to find out if the people of this county were interested in a road program, and after many meetings with the public-spirited residents of the various districts and the local officials, a program of some 300 miles of road was laid out. It then became necessary to get an engineer to

prepare the application and the necessary supporting data, for the application necessitated an estimate of the cost of road to be improved. All of the districts in this county employed the Capital Engineering Co., Jefferson City, Mo., which specializes in highway construction, to prepare the necessary engineering data to obtain the federal grants. The engineering firm, realizing that it would be impossible to make complete detailed surveys in the regular way for highway construction, was faced with the problem of devising a new procedure for conducting the surveys and for the letting of contracts. The type of work to be done of course, was the usual work necessitated by building low-cost roads, consisting of clearing, grading, drainage, structures and surfacing material, and maintenance stockpiles.

#### Plans and Specifications

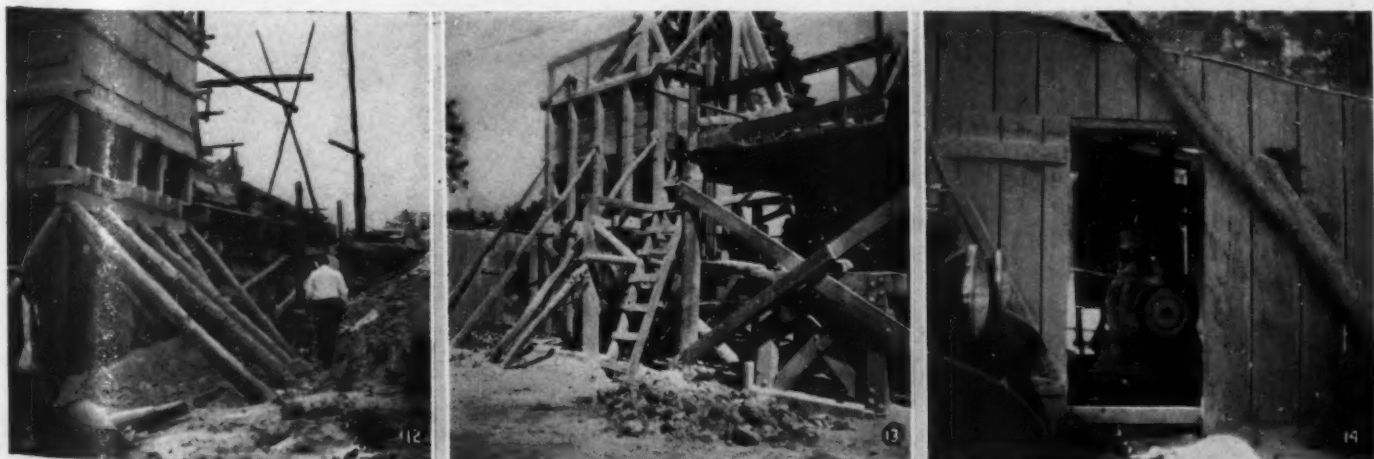
The procedure for making the estimate had to be prepared in such a way that the engineers for the PWA could check the estimated cost of the projects, and before the work could be put under contract, the plans and specifications for the work had to be approved by the engineers for the PWA. So this necessitated a clear and

understandable contract document, in order that all contractors could make competitive bids on them.

The surveys were made by dividing the road district into what was termed "road sections," and the road sections were then stationed off in tenths of a mile, and each road section was thoroughly gone over to determine and recommend the type of improvement to be made, on each road section and to describe, in words, the necessary work to be done on each individual road section. A strip map was prepared of each road, showing the type of ditches to be constructed, the cross-section of the road to be maintained, and the width of the road, the length of the pipe to be placed for cross-drainage, the location of house-entrance pipes, and where head-walls and fills were to be constructed, and the amount of surfacing material to be placed on the road.

In general, the roads were constructed with a 20 ft. roadway from shoulder to shoulder, and the surfacing material was applied adequately on each road to take care of the traffic which the road must carry.

After the estimate was approved by the PWA the districts called their bond elections, which required a two-thirds majority



(12), (13) and (14) Typical details of a movable crushing plant; each piece of timber is numbered and shaped in a central shop; a 125-hp. gasoline engine is the standard power unit and it supplies power 20 hours a day

to carry the bond issue. This phase of the program necessitated a great deal of work, and the people of Saline County are to be congratulated on the manner in which they rallied to carry their bond issue, as all of the bond issues carried from 8 to 1 to 20 to 1 for the issue of road bonds.

#### **Selling the Farmers**

As already noted, the promotion job did not end with getting the kind of project approved at Washington. There still remained the selling of the farmers on organization of a road improvement district, on a bond issue, finding a buyer or banker to take the bonds, getting out the voters of the district for the special election, etc. It meant practically a farm to farm canvass, speeches at church and schoolhouse meetings, and all the other methods of selling a local community improvement.

One would think offhand that Mr. McDowell might have been handicapped in this promotion because he obviously was out to get the contracts and to furnish the stone. To overcome this he was, as his friends know he can be, disarmingly frank. He admitted he wanted the contracts and he told, naturally, why he wanted them. As usually happens when we are frank, he found that this was not so much of a handicap if he could convince the farmers they were getting their money's worth.

He tells many interesting and amusing instances of his experiences, which show he has a good working knowledge of psychology. For example, he found opposition in some of the small villages based on the theory that hard roads made the bigger towns or cities more accessible and thus diverted trade from the village merchants.

#### **Incidents Provide Sales Arguments**

Chancing to be in one of these small villages on a summer day he found the streets congested with farmers' cars, when a shower came up, and in a short time the village streets were deserted. The farmers had all beat it home while the roads were still passable. On the other hand he had ob-

served that in a district where the farmers had hard roads, when a shower came up while they were home, they all knocked off work and beat it to town, for the movies, etc. This proved a telling argument.

Again, one farmer from whom he expected the most opposition proved to be his best ally. His children went to school in town, and so bad or uncertain were the roads to town that he had to board his children in town for the greater part of the school year. He said his taxes for the road improvement would cost him less, and he would have the pleasure of children's companionship to boot. So, most of the sales arguments came in one way or another from the buyers themselves.

After the bonds were voted, there was no difficulty in selling them, as the PWA had agreed to buy the bonds at par with 4% interest, however, the districts were able to dispose of all their bonds to bond buyers and banks in the State of Missouri, at a premium and with a lower percent of interest than the PWA had offered.

#### **Taking Bids**

When the engineering company had completed the contract documents and they had been approved by the acting state director of PWA for Missouri, the lettings were advertised for a period of 14 days prior to taking bids. The specifications in the contract document for all materials to be used, are the same as those used by the State Highway Department.

Bids were taken on a lump sum basis in the following manner: On each individual road section the contractor was required to bid one unit for blading, clearing and drainage structures, one for surfacing material and one for maintenance stockpiles. The lettings were held in the districts and the engineer for the district opened the bids at a public letting in the presence of an engineer from the PWA and a representative from the Federal Bureau of Investigation.

Up to this point, Mr. McDowell had been active in the work of getting the bond issue voted; however, it was now necessary for

him to figure the projects in order for him to bid, as by this time there were other contractors and producers who had become interested in bidding on this work. Fortunately for him, he had a large crushed stone plant within 15 miles of the work, and he also had a number of portable or rather movable crushed stone plants and inasmuch as he has operated his commercial plant for a period of fifteen years in this territory, he naturally knew where the desirable ledges of stone were that could be developed for local production, and, when the bids were accepted, he was the low bidder on the work.

#### **Business Really Created**

Thus without treading on any other producers' toes Mr. McDowell this season has created a business of 500,000 tons of crushed stone neither he nor anyone else would have had. He is not stingy with the experience gained from this pioneering work; he is in fact helping other Missouri producers to do the same; but they will have to work, for this kind of business does not drop into their laps.

#### **Crushed Stone Production**

For his local quarries Mr. McDowell has developed a standard type crushing plant—he calls them portable plants, but they are more accurately movable plants, for once in place they are just as substantial as many so-called permanent plants. They have heavy timber framing, each piece made in the shop at Blackwater and numbered. The design varies a little according to location. A good example is the one illustrated in the accompanying sketch—that at Fayette, Mo.

The standard power unit is a 125-hp. Waukesha gasoline motor, which drives all the equipment through a jack shaft. These motors have been in constant use for as much as six years. There is always a spare motor, and if trouble develops the motors are changed. There is a separate gasoline-engine-driven electric generator lighting unit, and compressed air for jackhammer drilling in the quarry is supplied by a portable, gasoline-engine driven compressor. Hand loading



(15) Portable compressors and jack-hammer type of drills used for blast-holing; (16) Superintendent Charles Briney of the Fayette, Mo. quarry and plant, and the boss, R. Newton McDowell; (17) Stock pile at the plant represents stone partly paid for

is employed in the quarry and motor trucks for transportation.

The primary crusher is a jaw in some instances and a No. 4 or 5 gyratory in others. The secondary crusher is a No. 3 gyratory, or similar type. The only screen required is a scalper, the oversize (over 1 3/4 in.) being returned to the secondary crusher by a belt conveyor.

The plant illustrated has a capacity of about 140 cu. yd. per 5-hour shift. It operates continuously four shifts. When the stone is made faster than used on the roads, it is stock piled, using motor trucks which drive over the pile. The stone is taken from the stock piles with a crawler shovel or crane.

After the contracts were awarded him, it was then quite a problem to build this large program of roads in an efficient manner, as the completion dates were very short, and the PWA construction regulations were very rigid. The PWA construction regulations required the districts to establish a prevailing wage scale in the communities. Their regulations also required a great deal of hand-labor to be done, and the contract documents stipulated as to what part of the work would be carried on by hand-labor methods. All labor had to be obtained through the National Reemployment Service; however, at the present time, he has been able to complete approximately 75% of the work, and the completed roads are ideal farm service roads.

#### Grading and Surfacing

For grading Mr. McDowell uses largely "60" Caterpillar tractors with 12-ft. power blades. He has in use about 16 such outfits. Supplementing these Caterpillar tractors and blades he is using about six "30" Caterpillars with 1-yd. Tumble-Bugs. He also has four Tractor "Maintainers" for doing the fine grading prior to placing on the roadways the necessary surfacing material.

He places on the roadway 3 in. of surfacing material on the less traveled road 9 ft. wide and after this road has been in use a short time this 9 ft. of stone will feather-edge out until about 12 ft. On the roads carrying greater traffic he places 3 in. of stone 12 ft. wide and this will feather-edge out to approximately 15 or 16 ft. The State Highway Department on its farm-to-market roads places about 1 3/4 in. of stone on a width of about 18 ft.

These roads, designed to exactly fit the requirements of the service they are to render, with no sacrifice in the quality of grade, drainage structure or riding surface, are good roads, adequately protected by proper drainage structures, built of materials which meet state specifications for farm-to-market road construction, but built longer and narrower to exactly fit a special requirement and supply a long felt need at prices within reach of the rural communities they are to serve. These roads are now being constructed at a total cost per mile varying from \$2000 to \$2700 per mile, de-

pending upon the nature of the territory served, the quantity of surfacing material required, and the availability of surfacing materials from local sources.

When it is considered, that there are thousands of miles of these roads in the State of Missouri, and that the same or similar conditions exist in a great many other states, it would seem that here, awaiting only proper promotion, is a field of almost unlimited possibilities for the producers of road building material.

#### Reasons For Success

No small part of Mr. McDowell's success is due to the thoroughness with which he has standardized and systematized not only his quarry operations but his roadwork. It is all planned to use as much hand labor as consistent with any kind of efficiency, as for example the employment of rough ashlar masonry for culvert head walls, etc.

How many other states have forgotten road improvement district laws is unknown, but it would pay producers elsewhere to find out if they exist. The farm districts to which they can be applied must be fairly well-to-do, and the farms must not already be taxed to their legal limits. Where these conditions prevail the farmers are just as anxious to have an all-weather road from their farms to the township, county or state highway as they are to have telephones and radios. One district sells another.

#### The Point

Many details have been omitted in this brief story, but the object is not so much to describe quarry operations and crushing plants, or methods of highway improvement, as to demonstrate that ingenuity and resourcefulness can make business in this day of relief labor, as well as at any other period in our history.

### WPA Rock Costs Too Much

Grundy County, Iowa, recently ceased operating a limestone quarry with free WPA labor. Stone taken from this pit during the period that it operated as a WPA project has cost the county \$1.50 per cu. yd., delivered on the highways. This is approximately the same price the county is paying for material obtained elsewhere on contract.

### Purchase Completed

Solvay Process Co. has completed purchase of the limestone quarry, crushing plant and lime kilns of the Louisiana Stone and Lime Co., Winnfield, La., in accordance with an option agreement previously reported in *Rock Products*. The purchase price is said to have been \$550,000. Most of the rock quarried will be used at the Solvay Process Co.'s Baton Rouge alkali plant, but some highway material will be marketed. C. A. Kitto is superintendent at Winnfield.

### Trains to Trucks

New Haven Trap Rock Co., New Haven, Conn., is converting its North Branford quarry from industrial railway haulage to motor truck haulage.

### Quarry Leased

Concrete Materials Corp., Waterloo, Ia., has leased the Pryoe stone quarry at Cedar Rapids, Ia., formerly operated by the city. A power shovel has been placed in the quarry and many improvements made to the plant, including a pulverizer for agricultural limestone.

### Prices—Contracts—Bids

Woodlawn, N. C.: State of North Carolina is building a plant to crush and pulverize limestone, announcing that agricultural limestone will be sold for \$1 per ton, f.o.b., plant.

Larned, Kan.: DeSoto Sand Co. was low bidder at \$2,567.11 for sanding 6.27 miles of highway.

Glasford, Ill.: Chas. Swords was low bidder on 16,344 cu. yd. of road gravel in place at \$1.50 per cu. yd.

Lorain, Ohio: County commissioners approved purchase of 7500 tons of crushed slag at approximately 70c per ton.

Eaton, Ohio: City council awarded contract to Walter J. Steiner, Laura, Ohio, for 200 tons of crushed-stone chips for street repairs at \$1.40 per ton delivered; to White Gravel Co., Camden, Ohio, for 120 tons of sand for disposal plant at 65c per ton.

Belle Plaine, Iowa: B. L. Anderson, Toledo, Ohio, was awarded contract for furnishing 42,026 cu. yd. of crushed stone from various local quarries at \$57,578.90, or \$1.37 per cu. yd.

Denver, Colo.: Pople Brothers Construction Co., Trinidad, Colo., was low bidder on supplying gravel for 65 miles of oil-top on U. S. 50 between Montrose and Doyle; bid \$49,056 for one grade of gravel, \$53,655 for a better grade, selection to be made by state highway department.

Cabery, Ill.: Round Grove township awarded contract for 4382 cu. yd. of crushed stone to Lehigh Stone Co., Kankakee, Ill., at \$1 per cu. yd. delivered on railroad siding at Reddick.

Ireton, Iowa: Hartzell and Evans, Early, Iowa, were awarded contract for screening, loading and hauling gravel from Sioux county pits at 16c per cu. yd. for hauls up to 1 mile; 3c per cu. yd. for longer hauls.



A 130-hp. Diesel engine drives the 6-in. pump through a V-belt drive, on the dredge of Schoenberg Gravel Co.

Schoenberg Gravel Co. started dredging sand and gravel from Copiah Creek, a mile south of Georgetown, Miss., in October, 1934. The plant is essentially a gravity screen operation with a 6-in. dredge pump.

The deposit has no overburden to speak of, where it is being worked along the bank, and varies considerably in depth and in the proportion of gravel to sand. The dredge is operating in a bend of the creek about  $\frac{3}{4}$  of a mile above its junction with the Pearl River. In flood times, the river backs up in the creek, and generally leaves a new deposit of workable material in the places already worked out—a condition making it unlikely that available sand and gravel will ever be so distant from the fixed plant that expensive long distance pumping or relaying of the material will be necessary.

The deposit does not contain a high percentage of large gravel, and varies

considerably in depth and in the distribution of its fines. For example, the present location, where the dredge is pumping, has a preponderance of fines, and is an ideal location when pumping masons' or plasterers' sand. By moving the dredge a distance of 40 or 50 ft. to either side, a good grade of concrete and road gravel is available, with a minimum of fines.

A year ago, the 6-in. Amsco pump, driven by a 75-hp. Climax gasoline engine was pumping at a point 800 ft. from the screening plant, and has dredged out sand and gravel to the present location—450 ft. from the plant. The flood waters have laid down a new deposit at the old location, which can be re-worked. The pumping depth varies from 6 to 16 ft.

In the summer of 1935, the dredge boat was improved and Diesel power was substituted for gasoline for driving the pump. A 130-hp. Caterpillar 6-cylinder Diesel engine was installed to drive the pump,

# SCHOENBERG

## and other plants—

# DIESEL

## do the

through a V-belt drive. The engine operates at 900 r.p.m., and the sheave ratio is such that the pump travels at 960 r.p.m.

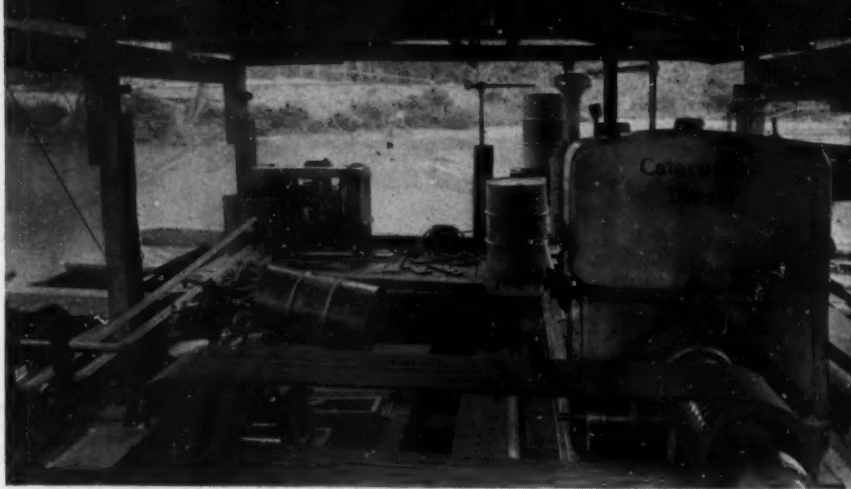
At the same time a 25-hp. McCormick-Deering gasoline engine was added to drive, through a 4-in. flat belt, a 3-in. Fairbanks-Morse pump which supplies a water pressure of 75 lb. to the pump stuffing box. This pump also serves as part of the cooling system for the Diesel engine, which is not equipped with a radiator. A 55-gal. oil drum, open at the top, is set at one end of the dredge, so that its bottom is above the level of the water pump of the Diesel. As the engine is warmed up sufficiently, the thermostat opens, and hot water flows through a  $1\frac{1}{2}$ -in. pipe to the drum.

Fresh cold water is pumped into the drum by the same 3-in. pump supplying



Small gravity plant for 6-in. dredge operation. Rejected pea gravel in foreground

# GRAVEL CO. *down South—make* ENGINE work



Another view on board the Schoenberg Gravel Co. dredge, showing the Diesel engine and a 25-hp. auxiliary gasoline engine

By  
Bror Nordberg

water to the pump stuffing box, and cold water is pumped back to the Diesel engine through a 1½-in. pipe entering the bottom of the drum. The drum is supplied with a ¾-in. overflow pipe.

The 20-ft. by 30-ft. wood dredge hull was made more buoyant, to support the weighty machinery, by adding two 30-ft. by 4-ft. wood pontoons. The 450-ft. pipe line discharges over three gravity screens, placed above the other. The top screen is 8-ft. by 20-ft. and has 1½-in. openings. The ¾-in. and ¼-in. mesh screens below are each 8-ft. by 12-ft.

Oversize material, which never exceeds 5% of the total, is wasted. Gravel from ¾-in. to 1½-in. passes direct to a bin of 3 cars capacity below. When concrete gravel is being run, pea gravel (¾-in. to ¼-in.) is flumed back to the creek, where it can be reclaimed when needed. Sand from ¼-in. down passes through a 2-ft. wood flume, approximately 200-ft. long. Concrete and masons' sand are collected in a 16-ft. settling box 4 ft. deep, by inserting ¼-in. and 3/32-in. mesh screens, respectively. The finished aggregate is shipped on the Gulf, Mobile and North-

ern Railroad to Jackson and other nearby cities.

From two to three cars of sand and gravel were pumped daily a year ago, when pumping 800 ft. with the gasoline engine, and the power cost per car of material ran from \$2 to \$4. Since the Diesel installation, production averages a 60-ton car per hour except when running fine material and, according to Mr. Schoenberg, at a power cost of 85c per car. Since 130-hp. was substituted for 75-hp. on a 6-in. pump, there is enough reserve power to efficiently pump up to 1300 ft. if necessary. A 5-hp. generator is to be installed on the fan shaft of the Diesel



Schoenberg Gravel Co. dredge on Copiah creek. The plant is in the background at the right

engine, to supply light for the dredge for night operation.

Kivett and Reel, Inc., Sun, La., whose sand and gravel plant was described in the June, 1935, issue of *Rock Products*, changed from steam to Diesel power this spring.

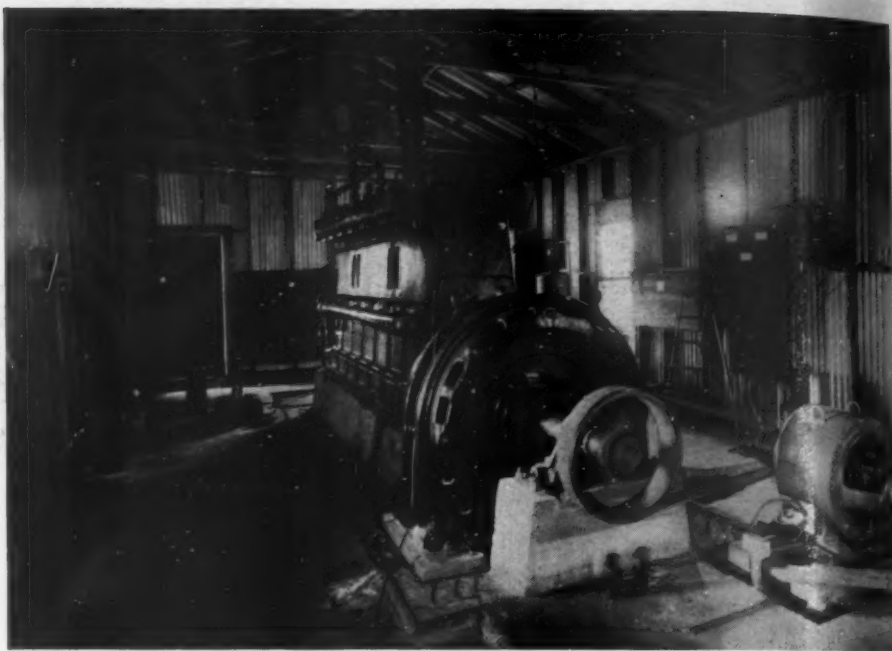
A 262½-hp. 7-cylinder Buckeye Diesel engine, running at 400 r.p.m., drives the alternating current generator to supply the electrical energy necessary to operate all plant motors. When running under full-load, 225-hp. is necessary to drive the motors.

The type SAM alternator, manufactured by the Ideal Electric and Manufacturing Co., has a rating of 175 kw. and 219 kv.a. and supplies 3-phase 60-cycle electrical energy at 2300 volts. The alternator is direct connected to the Diesel engine.

A Western Electric Co. Type EB d.-c. excitor is driven by the alternator shaft at 1250 r.p.m. through a 4 V-belt drive. The excitor is rated at 15 kw., 137 amp., and 115 volts at full load. The bearing between the alternator and excitor sheave is a PR507 model, manufactured by the Shafer Bearing Corp.

A 3-hp., one-cylinder engine and 3¼-in. by 4-in. air compressor unit supplies the necessary air pressure to start the Diesel engine. A pressure of approximately 100 lb. per sq. in. is required. A 1500-gal. wood, water tank was installed next to the power house as part of the cooling system. A size 2A pump, manufactured by the American Steam Pump Co., driven by a 5-hp. 3-phase, 60-cycle Fairbanks-Morse motor, supplies the cooling water.

An Ideal panel switchboard was installed with necessary meters and control instruments, which include a Type 1 Sim-



At Kivett and Reel, Inc., Sun, La., this Diesel engine supplies all plant power. Excitor and panel board may be seen at right

plex voltage regulator; alternating-current voltmeter and ammeter and a direct current voltmeter, all manufactured by the Roller-Smith Co.; and a Condit trip coil, manufactured by the Condit Electric Manufacturing Co.

The 10,000-gal. tank used for fuel oil for operating the steam engine is now used for the 32 deg. gravity Diesel oil. Approximately 200 gal. of Diesel oil is used in a 24-hr. run at a cost of 5c per gal. and 3 gal. of lubricating oil.

A Kohler gasoline-engine driven electric plant is set up in the power house for supplying lights for the plant in times of

emergency. It is a model DZ1352, rated at 1500 watts, to operate at 1000 r.p.m.

The company has been operating 24 hours daily including Sundays for the past few months. A good proportion of the demand has been for gravel for black-top roads. Another recent improvement was the installation of a 4-in. Fairbanks-Morse wash-water pump, which is driven at 1750 r.p.m. by a 25-hp. Fairbanks-Morse motor.

Charles Black Sand and Gravel Co. has had a dredge operation at Fluker, La., since 1932. Recently it has installed a new Diesel engine and built a new plant. The new plant is essentially the same as the one it replaces, but was built because the pumping distance to the old plant had increased up to 1000-ft. and more economical pumping was desired.

The deposit being worked is approximately 25 ft. deep and contains about 50% sand. A 7-cylinder, 262½-hp. Buckeye Diesel engine was installed on the 20 by 45 ft. dredge hull to drive the 10-in. Amsco pump. The pump at present is pumping in 25 ft. of water. The Diesel engine was installed as a replacement for a 225-hp. Anderson Diesel engine. The engine operates at approximately 375 r.p.m. and drives the pump through a 20-in. belt at 600 r.p.m.

A 15-hp. Triumph Electric Co. generator driven off the Diesel shaft by a 6-in. belt drives a 7½-hp. motor which in turn drives a constant duty Dayton-Dowd 1½-in. pump for priming and to supply pressure to the pump packing gland. A Robbins & Myers 5-hp. electric motor drives a 2-in. Gould pump to supply cooling water for the Diesel engine.

Two Otis elevator hoists, a three-drum and a two-drum, each with a 50 to 1 gear



View from stern of dredge of Charles Black Sand and Gravel Co., Fluker, La., showing Diesel engine which drives 10-in. pump



Dredge of Charles Black Sand and Gravel Co. Pump discharge at left is to be relayed to new plant, to give added wash

ratio and driven by 7½-hp. Northern Electric Co. motors, handle the vertical and lateral movements of the suction pipe, respectively. A 25-hp. Mason Diesel engine is to be installed in the near future for driving the hoists and lighting of the plant.

Fuel consumed by the Buckeye Diesel engine amounts to 100 gal. of 30-32 deg. gravity oil per 10-hour day, and 1 gal. of lubricating oil is used in the same period, according to the plant's operating men. Fuel oil is kept on hand in a company-owned 10,000 gal. tank car delivered direct to the company's plant on its own railroad.

A railroad spur a mile in length on the Illinois Central railroad has been constructed to the plant, which has been built within 200 ft. of the present working location of the dredge.

The plant is a gravity screen operation, with three 10-ft. by 12-ft. screens set at a 45 deg. angle. Generally, these screens have 1½-in., ¾-in. and ⅜-in. openings. Throughs from the ⅜-in. screen pass to a wood flume, where the fines are recovered, with a 6-mesh screen over the sand settling box for recovering mason's sand, 4-mesh for concrete sand, etc. Gravel is recovered in three 4-yd. bins, from which it is discharged directly to the cars.

### New Plant

L. & S. Material Co., Onalaska, Tex., was recently organized by C. A. Leggett and L. S. Stanford, to produce sand and gravel for shipment by rail or truck, at a new plant near Kickapoo, on the W. B. T. & S. R. R. Mr. Stanford is president of the company.

### Dam Aggregates Contract

Austin Bridge Co., Dallas, Tex., has been awarded a contract to supply sand and gravel and crushed stone for construction of the Buchanan and Inks dams, Colorado River Authority, Austin, Tex.

### New Company

Arpin-Lyon Gravel Co., Glen Allen, Miss., is the name of the new hydraulic dredge sand and gravel operation, promoted by R. M. Arpin and L. M. Lyon, reported on page 47, July issue of Rock Products.

### Lease Pit

Foley Bros., St. Paul, Minn., have leased a gravel pit at Kasota, Minn., and installed a temporary plant.

### Two Shifts

Eastwood Sand and Gravel Co., Grayville, Ill., is reported working two 8-hour shifts to fill orders, mostly for local highway work.

### Reorganized

Lyman-Richey Sand and Gravel Corp., Omaha, Neb., has been reorganized with the following officers: F. P. Curtis, president; L. C. Curtis and D. H. O'Leary, vice-presidents; J. R. Burke, secretary; T. A. Griffis, treasurer.

### New Firm

Lake Superior Gravel Co., Bessemer, Mich., is the name of a new firm to produce washed sand and gravel, with a plant between Ironwood and Bessemer. Peter Giacherio, Ramsey, Mich., is president.

### Building Plant

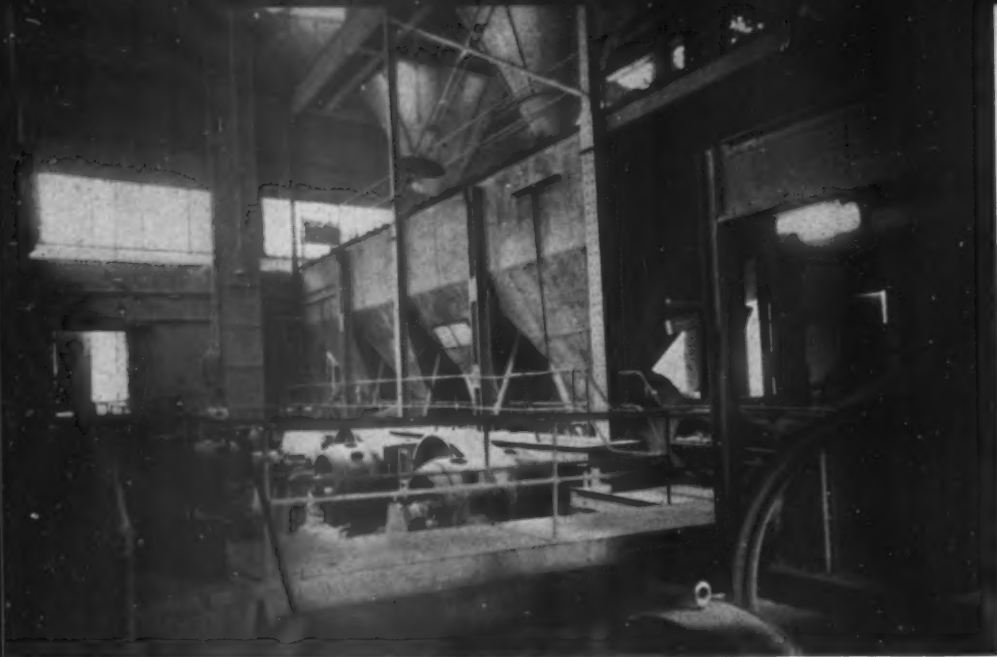
L. Romano Engineering Corp., Seattle, Wash., is building a sand and gravel plant on the Yakima river due west of the Roza tunnel No. 3, Roza division of the Yakima reclamation project. This company was recently awarded a contract for aggregates.



View on Charles Black Sand and Gravel Co. dredge, showing two hoists in center



Pump and hoists aboard dredge at Fluker, La., as seen from stern of the dredge



Two new mills in raw mill grinding department, Louisville Cement Co.

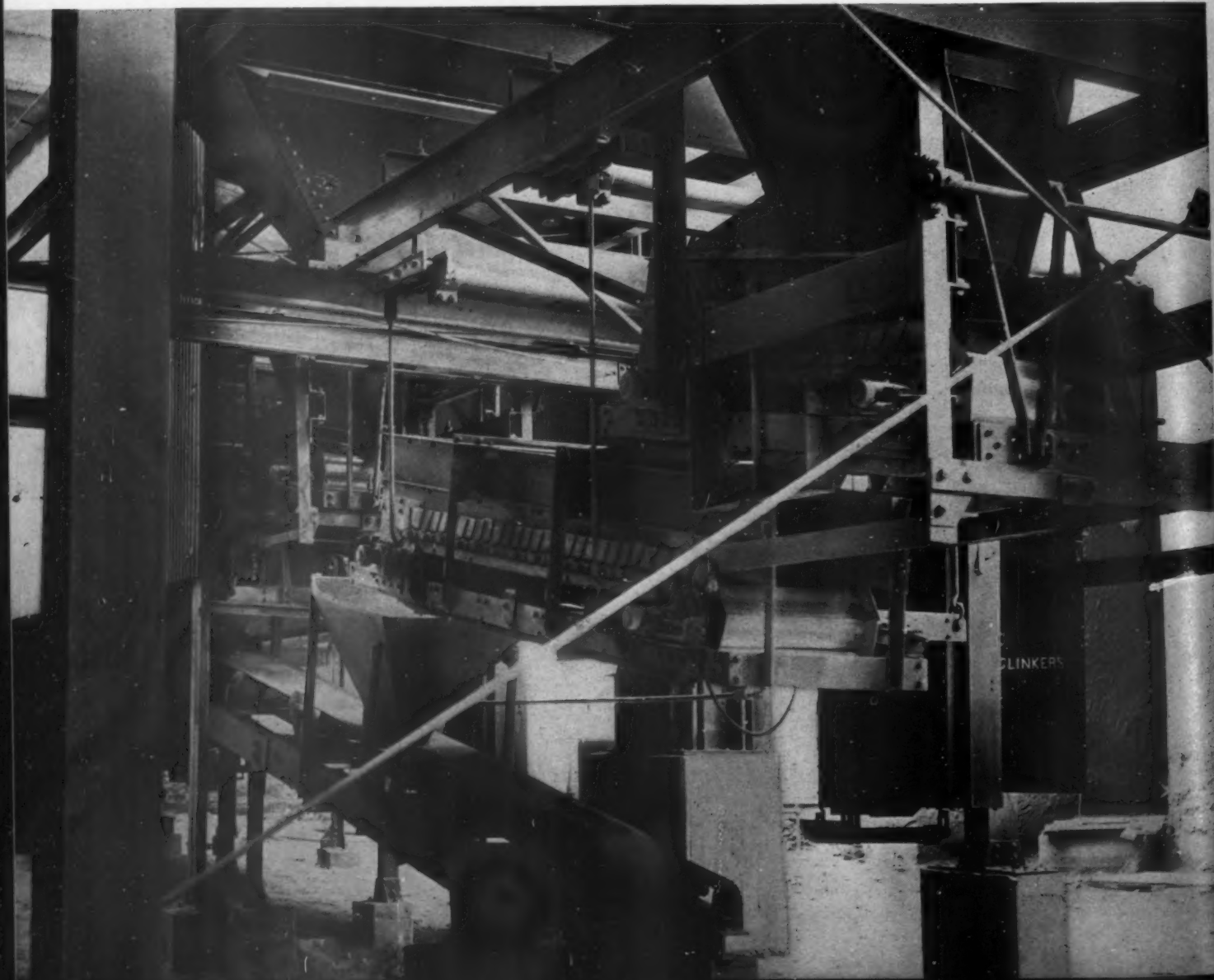
## *New Equipment in Three Cement Plants in the South Reveals New Methods*

# Time MARCHES on in the Cement Industry

Louisville Cement Co. resumed operations at its Speed, Ind., plant on April 11, after a shut-down to make improvements of considerable importance.

Included in the equipment installed are two 16-ft. Raymond mechanical air separators, so arranged as to operate in closed

Scale system of Louisville Cement Co. for proportioning raw materials



*Improved  
Grinding*

---

*Better Raw  
Material  
Proportioning*

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*Kiln Firing*

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*Dust Collection*

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circuit with the tube mills in grinding the raw materials. Prior to this installation, single-pass grinding was used.

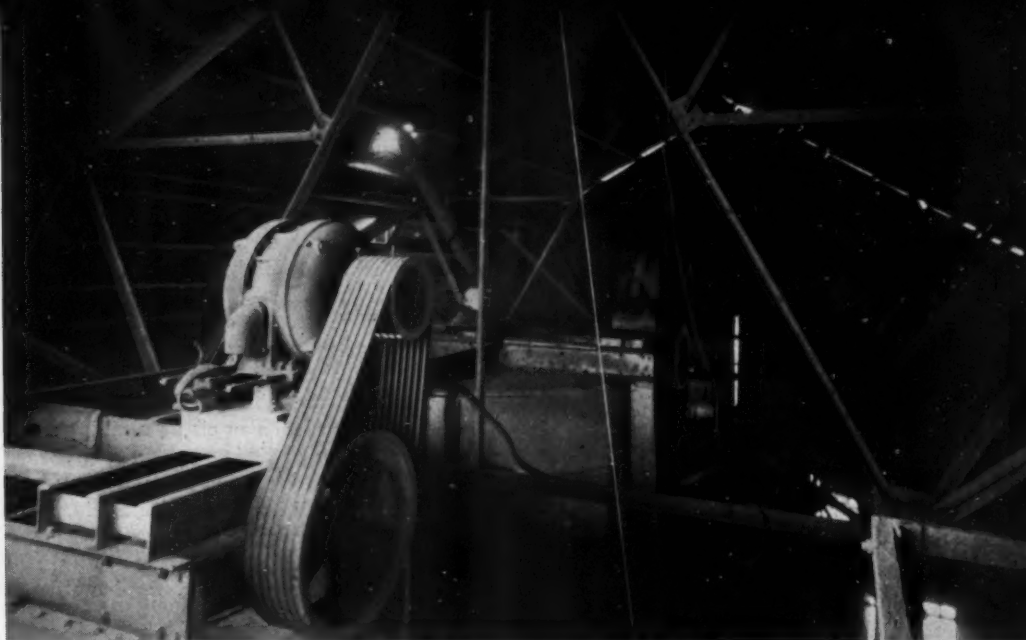
Three No. 16 F. L. Smidth tube mills and one No. 18 mill are closed-circuited to the new air separators. Two of the smaller mills operate with one of the separators,

and the No. 18 mill is connected to the second separator. The equipment is so set up that the third small tube mill can be operated with either separator.

The fine product from the tube mills is raised by bucket elevator and discharged to the separators. Fines from the separators pass to the kiln bins by way of a screw conveyor and elevator system, and the tail-

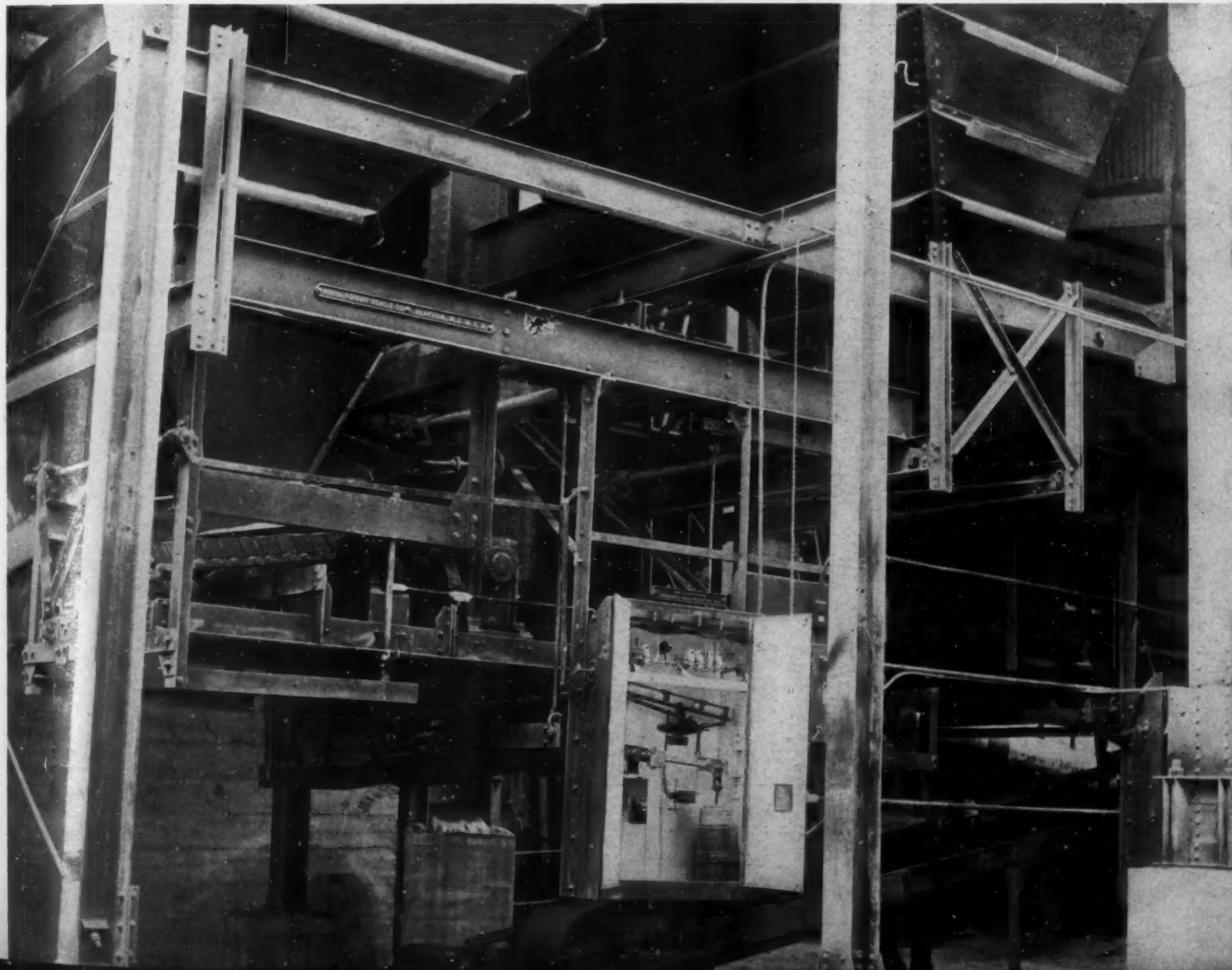
ings pass directly back to the tube mills in advance of the new material fed to the mills. This makes it possible for this material to be rehandled to the separator ahead of the material being run through the first time, and so helps eliminate segregation.

The installation was made for the purpose of preventing very coarse material from entering the kilns and to act as a fineness



*The top of the separators, Louisville Cement Co.*

*Both shale and limestone, and clinker and gypsum are delivered in an even stream at Louisville Cement Co. plant*



control. By such a fineness control, it is possible to cut down the percentage of free lime in the finished cement.

At the same time, the addition of the separators has increased the capacity of the mills. For a fixed output of ground material necessary to the operation of the kilns, the number of hours of operation of the tube mills has been reduced. Two 75-hp. Allis-Chalmers motors drive the separators, through V-belt drives at 1160 r.p.m. under full load, the shaft speed being 540 r.p.m. Three 175-hp. motors are required to operate the three smaller tube mills, and a 300-hp. motor drives the larger mill. By the addition of the two 75-hp. motors, the hours of operation of the four larger motors are cut for the same output, with a resultant saving in electrical power. A better final product and a saving in power expense have been accomplished through the installation of the air separators.

#### Better Proportioning

Type 56 Richardson Convey-o-Weigh scales have recently been installed to automatically weigh the correct proportions of limestone and shale before preliminary grinding, and similar units were set up to weigh the clinker and gypsum prior to grinding. The new equipment displaces the old hopper and platform scales, controlled manually through air-operated valves and serves to eliminate the human element in controlling the proportioning of materials. The newly installed scales have resulted in a saving of labor, and by their addition it is hoped that a more uniform product will result.

The shale and limestone scales operate together, and are interlocked electrically so that an interruption in the operation of one or the other will cause the second scale to stop. The feeder is interlocked electrically on each scale so that the apron has discharged completely before another batch is released to the scale.

Rock from 1¾-in. to dust and shale from 1-in. to dust are weighed out in batches

of 1000 lb. of limestone to from 200 to 240 lb. of shale, as determined by the chemist. Batches are run on an average of two each minute, slightly faster than under the old system, when 2-ton batches were made. The weigh beams are set, and the fully automatic system takes care of all batching without any attention from operators. After weighing, the shale and limestone drops from the scales to an elevator, which carries it up to the preliminary mill hoppers.

The clinker and gypsum scales are filled from overhead hoppers, which are loaded by a traveling crane. A thousand pounds of clinker and the necessary amount of gypsum are proportioned together, varying with the type of cement being made. After weighing, the product discharges to a 24-in. Link-Belt conveyor belt. An elevator handles the discharge from this belt conveyor, after which a chain-drag conveyor, manufactured by the National Malleable and Steel Castings Co., carries it to the preliminary mill hoppers.

A structural and corrugated steel roof was built over the clinker storage this spring to give a greater uniformity in the clinker to be ground. A saving has been effected by eliminating the costly grinding of rain-soaked clinker, and a greater fineness and surface area of the finished cement has resulted.

#### Unit Coal Pulverizers

Lone Star Cement Corp., at its Birmingham, Ala., plant, recently installed three unit coal pulverizers for direct-firing of its 10x280-ft. wet-process kilns, on the floor directly below the firing floor.

Under the present operating set-up, the coal is discharged from the railway cars to track hoppers adjacent to the plant, from which it is fed by a 30-in. pan conveyor to a bucket elevator. This elevator in turn discharges to a 14-in. screw conveyor which empties into the old pulverized-coal tanks, which serve as the raw coal storage.

Raw coal from these tanks flows by gravity to the feeders on the mills, and then is pulverized, and dried by heated air from the

kilns, and blown into the kilns, with the correct amount of primary air for combustion.

A 75-hp. motor drives each mill, and each of the fans is driven by a 50-hp. motor. A panel board with necessary control gauges has been installed on the kiln floor for the operator's convenience.

Using coal with B.t.u. content of 13,000, which is ground to fineness of 80% through 200 mesh, the coal consumption after installation of unit pulverizers shows a reduction of 11% from prior operation. Kiln capacity has increased 4%. The average power consumption for coal pulverization has decreased 50% after installation of these unit pulverizers.

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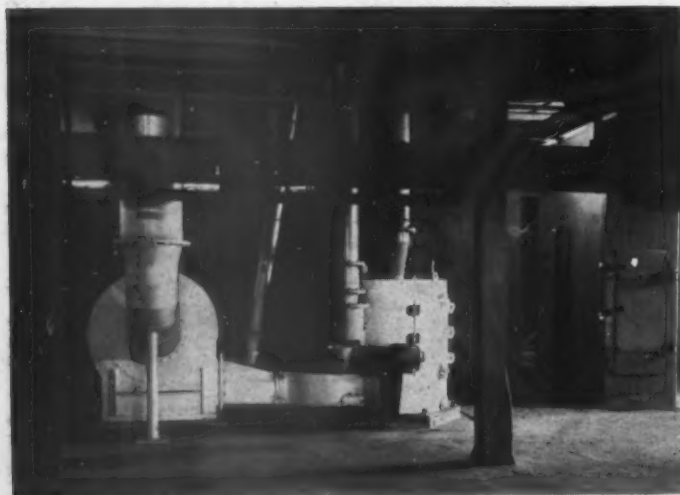
#### Dust Collection

Kosmos Portland Cement Co., Kosmosdale, Ky., several months ago, installed a No. 30, Type F. Roto-Clone (American Air Filter Co.). The installation serves a dual purpose, as a dust collector and for inducing greater draft on the limestone dryer. The machine is driven by a 30-hp. Allis-Chalmers motor (using 15-hp.) through a 3 V-belt drive, at 800 r.p.m.

The Roto-Clone is installed at the feed end of the dryer, by way of a 4-ft. circular opening in the dryer, and a 30-in. diameter pipe connects to the dryer stack. Dust-laden air is pulled a distance of approximately 120 ft. by the suction created by the impeller-like blades of the Roto-Clone.

Three intake connections are made at the 18-in. Williams mill, and connections are also made at the top and bottom of the elevator feeding this mill as well as at the chute and at the bottom and top of the elevator taking material from the mill. The size of the particles, which are separated and discharged by the Roto-Clone, depends upon the weight of the material handled. In this case, limestone is the material, and sizes from 60 to 10 microns are removed, with only the particles from 10 microns and under going to the stack.

The dust taken out passes below to a



Unit coal pulverizer for direct firing of kiln at Lone Star Cement Corp., Birmingham, Ala., plant



Air intake and pipe from mill to kiln and the control panel for one pulverizer at Birmingham plant

small hopper. Some dust, along with about 5% of air, passes through a 10-in. pipe to a 3½-ft. diameter cyclone, or concentrator. Some additional fines are settled out here and pass by gravity through a 6-in. pipe to the hopper below, while the air passes through a 12-in. diameter pipe back to the stack.

A Fuller-Kinyon pump carries the fine product collected in the hopper back to bins, from which it is added uniformly to the raw mix. The installation, in addition to collecting dust, has enabled the dryer to dry more material per hour by the induced draft, which makes possible handling more hot air through the dryer.

The company has started construction of a reinforced-concrete stack, 300 ft. high, with top and bottom inside diameters of 15 ft. and 22 ft. 6 in. to replace the nine present stacks.

### Rotary Kiln Insulation Pays

**A**N INVESTMENT of \$3990 made by the Pennsylvania-Dixie Cement Corp. for insulation installed in its Clinchfield, Ga., plant has paid more than \$20,000 in profits during the last six years, according to *The Power Specialist*, house organ of the Johns-Manville Co., which continues:

"It was back in August, 1929, when the Pennsylvania-Dixie Cement Corp. decided to use Johns-Manville 'Superex' blocks to insulate one of three kilns at Clinchfield. This No. 1 kiln, identical in size with the other two kilns, is 10 ft. in diameter and 175 ft. long. Various types of insulating materials had been used in it prior to that time, and, while the insulating qualities of these materials had been entirely satisfactory, they did not have the mechanical strength to withstand the shak-

ing and jarring which resulted from the rotation of the kiln shells.

"Blocks of Superex, 6 in. x 36 in. x 2½ in. were applied at a point beginning 40 ft. from the hot end of the kiln, and continued for a distance of 100 ft. along the interior surface of the kiln shell to within 35 ft. of the end where the slurry enters. A thin layer of J-M No. 319 Insulating Cement was first applied to the interior surface of the steel shell area. Superex blocks were then laid over the cement, after which another thin coating of insulating cement was put on. A 6-in. course of refractory brick was placed over the second coat of cement. Four rows of 9 in. x 9 in. x 4 in. key fire brick, spaced at 90 deg. intervals about the perimeter, were run longitudinally along the shell. These serve as a wedge to keep the fire brick and the Superex in place as the kilns rotate. For 40 ft. at the hot end of the kiln, 6 in. of fire blocks alone were used, as was also the case on the 35 ft. at the end where the slurry enters.

"This first installation was so satisfactory that the company, six months later, used Superex to insulate kiln No. 3. Kiln No. 2 was not insulated for the reason that it is not in regular service. The total cost of the two installations, including labor, amounted to \$3990.

"Since daily records of coal consumption are carefully kept by this company, comparisons could be made between the costs of operating the kilns before and after the insulation was applied. These figures immediately showed the important economies which had been accomplished. Recently they have been brought up to date to include savings effected from the time the insulation was applied until April 1, 1936, in the case of kiln No. 1, and until April 1, 1935, in the case of kiln No.

3. A new firebrick lining was installed in kiln No. 3 in April, 1935, at which time the insulation was replaced. Savings on this kiln have been computed, therefore, only on the investment in the original insulation. Kiln No. 1 has required only minor repairs since the original installation and is still giving excellent service.

"Records show that kiln No. 1 was operated 1348 days from the time the insulation was installed until April 1, 1936. To arrive at the savings brought about, 1348 is multiplied by 3 (tons of coal saved per day) and this in turn is multiplied by \$3.70 (average price per ton of coal). The total is \$14,962.

"In the case of kiln No. 3, there were 817 days of operation from the time the insulation was applied until April 1, 1935. Savings effected during that time amounted to \$9068.

"This produces a total saving on both kilns amounting to \$24,030. From this, subtract the total cost of the insulation installed, \$3990, and there is a net saving of slightly more than \$20,000."

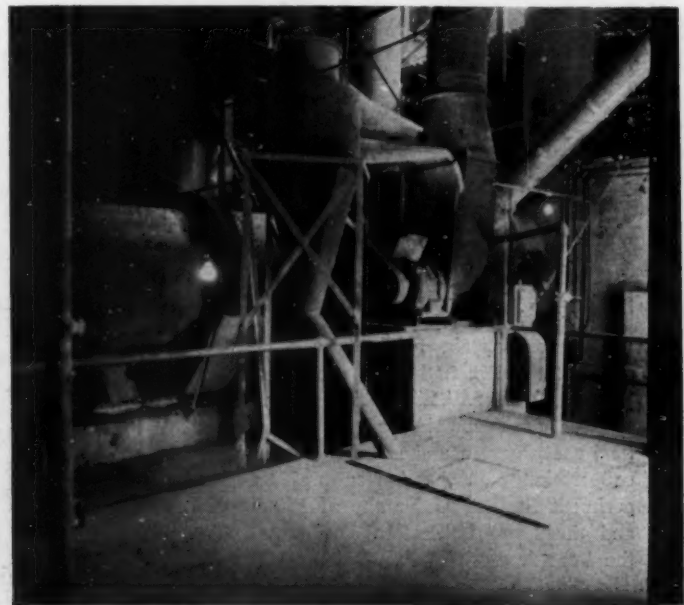
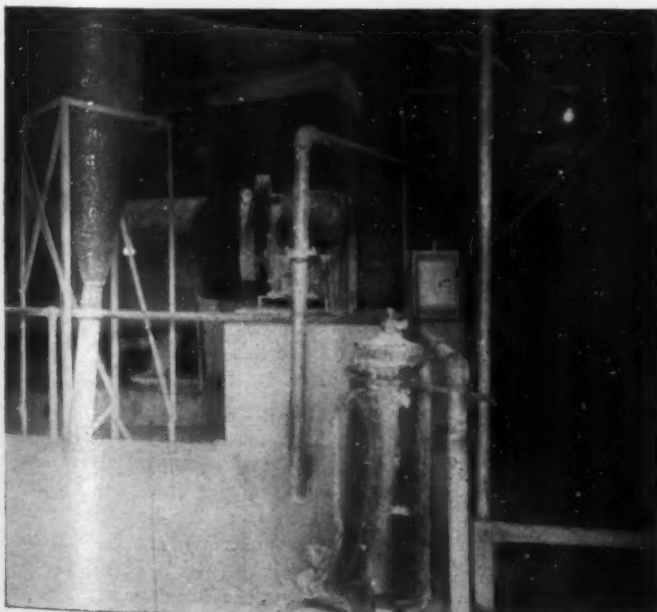
### Increasing Storage

Universal Atlas Cement Co., Waco, Tex., plant is reported making improvements which include a new stock house.

### Concrete Pavement Yardage

**A**WARDS of concrete pavement for June, 1936, were announced by the Portland Cement Association as follows:

	Sq. yd. awarded during June, 1936	Total sq. yd. for year to date, June 27, 1936
Roads .....	2,942,410	13,522,160
Streets .....	1,201,983	6,546,658
Alleys .....	43,162	169,267
	4,187,555	20,238,085



Dust collecting equipment at Kosmos Portland Cement Co., Kosmosdale, Ky. Left-hand view shows impeller blades in housing just above acetylene welding tank; cyclone with 6-in. pipe to fines hopper below; pipe which brings dust-laden air from mill. Right-hand view shows cyclone with 6-in. pipe, diagonal pipe from mill and stack for dryer

# Soil Conservation Service Program In Illinois\*

By F. A. Fisher,

State Coördinator, Soil Conservation Service,  
U. S. Department of Agriculture

SO MUCH has been written about soil conservation and so many agencies are engaged in promoting some phase of this work that it may be well to briefly outline the history of the Soil Conservation Service in Illinois.

In November of 1933 the Soil Erosion Service came into being as an emergency organization under the Department of Interior. Illinois was the third state to be given an S.E.S. erosion demonstration area. This area was located in McLean and Ford counties and comprised some 150,000 acres of undulating to gently rolling corn belt soil. It was established not in the most eroded section of the state but in a comparatively good area for it was recognized that the conservation of good land was a more important thing in Illinois than the rehabilitation of land already badly eroded.

In this area the S. E. S. coöperated with farmers in establishing erosion control demonstrations.

In April, 1935, the old S. E. S. became, by an Act of Congress, a permanent bureau in the Department of Agriculture and was renamed the Soil Conservation Service. At this time all CCC camps which had been doing soil conservation work in Illinois under the direction of the State Department of Conservation were placed under the technical direction of the S. C. S. During the following summer additional camps were established until 34 CCC camps were engaged in soil conservation work in Illinois. These camps have now been reduced to 28.

## Functions of the S.C.S.

The functions of the S. C. S. are divided into five main classes.

- (1) The carrying out of a research and demonstration program to determine and demonstrate the best and most economical methods of erosion control.
- (2) The operation of three demonstration projects situated as follows: No. 1 in McLean and Ford Counties (Sangamon River); No. 2 in Madison County (Edwardsville); No. 3 in Stephenson County (Freeport).
- (3) The carrying on of erosion control work upon certain public lands. The work at the Dixon Springs sub-project is of this nature. This work is for the purpose of developing a pasture and land use program and is being done in coöperation with the Agricultural Experiment Station, University of Illinois and the Land Utilization Division of the Resettlement Administration.
- (4) The S. C. S. is managing 28 CCC camps throughout the state.

\* Presented at the Fourth Annual Mineral Industries Conference of Illinois, Urbana, Ill., April 24-25, 1936.

## Editor's Note

ONE of the soundest measures of the New Deal is its soil conservation program. Any one who will take the time and trouble to read the opinions of experts for the last 30 or 40 years will find that they are unanimous in their condemnation of our American system of agriculture, which takes no account of the needs of future generations.

Our soils capable of cultivation are very thin layers over gravel, hardpan or bed rock, and to allow them to be washed away into streams year after year, with no thought of their future need is little less than criminal. The widespread drouth and the evidence that we are only at the beginning of a cycle of dry years emphasize the necessity of a broad gauge viewpoint toward this soil conservation problem.

The producer of agricultural lime and limestone is vitally interested. Acid soils are barren soils, and barren soils are those that erode rapidly. When farmers become educated to a soil conservation program, the demand for agricultural lime or limestone will be vast beyond comprehension.

This paper describes briefly and accurately just what the Soil Conservation Service is doing in a "typical prairie state," with figures on the limestone requirements. Producers of agricultural liming materials everywhere should get behind this movement to conserve our most precious heritage—our arable soils.

- (5) The S. C. S. is developing in coöperation with the State Extension Service a program which it is hoped will make practical erosion information available to all interested farmers.

## Demonstration Projects

Demonstration projects now being carried out in coöperation with the Agricultural Experiment Station and the Extension Service include—

- (1) Coöperative Pasture Improvement Demonstrations.
- (2) Coöperative Farm Woods Improvement Program.
- (3) Coöperative Demonstration to determine Adaptation, Methods of Establishment and Maintenance of Plant Species on Sandy Soils.
- (4) Combined Farm Management erosion and land use survey on representative farms in 5 different types of farming regions in the state.
- (5) Coöperative silt measurement project. The Research Division of S. C. S. and the State Water Survey are starting a study of silting in storage reservoirs in Illinois.

No erosion control work on private lands, including demonstration projects, may be undertaken by the Soil Conservation Service except through legally constituted Soil Conservation Associations. Thirty-three of these Associations have been organized in Illinois through the coöperative efforts of the local county agents, who are representatives of the Agricultural Extension Service, and the personnel of the Soil Conservation Service.

At the present time soil conservation work is being carried forward in each community that falls within the boundary of a camp or project area in coöperation with these Soil Conservation Associations.

The S. C. S. is providing in each of the project and camp areas technical supervision to help coöperators establish upon their farms a well-balanced erosion control program. Such a program includes a land use survey from which is developed a long time management plan which insofar as possible adapts crop rotations and soil treatment to meet both the economic needs of the farmer and to protect his farm from further erosion.

## Legumes Needed

It is natural that the recommended practices will include an increased use of legumes and grasses and the return of lands unsuited for cultivation to pasture and to forest plantation or wood lots. Improvement of existing pastures is emphasized as well as the establishment of new ones.

Practices which aid in the prevention of erosion or help in the control and management of eroded farms and strip cropping, contour farming, terracing, contour furrowing and the construction of dams and earth fills.

Soil conserving practices such as tree planting and timber improvement are very definite aids in game conservation.

This part of the conservation program is being even farther advanced by the planting of shrubs, vines and grasses that will not only aid in erosion control but will provide winter food and cover for wild life.

The back-bone of any erosion control program is vegetation. We have been trying in Illinois to give this part of the program its rightful place.

One of the greatest factors which limits the growth of the best types of vegetation is soil acidity and in a general way most soils subject to erosion (unless the soil is in a virgin condition or has been eroded down to calcareous material) are acid in some degree.

## Limestone Requirement

Figures prepared by the State Soil Survey give the original limestone requirement for the soils of the state at slightly upwards of

63,000,000 tons (63,685,194). At the end of 1934 a total of 6,063,292 tons had been applied or about 9½% of the needs of the state have been supplied.

The state soil survey has divided the erosion in the state into four different groups:

Destructive erosion, 3,102,080 acres  
 Serious erosion, 3,143,040 acres  
 Harmful erosion, 12,584,320 acres  
 Negligible erosion, 16,692,480 acres

Out of 35,521,920 acres in the state better than 18 million acres have an immediate or a potential erosion problem and we can safely assume that most of this acreage, where cultivated, is in need of limestone.

Taking the 150,000 acres that make up the Sangamon River demonstration area and using the same factors employed by the Illinois Soil Survey in compiling the state limestone needs, we find that the original needs of this area for limestone amounted to 228,669 tons.

In the whole of McLean County 184,936 tons of limestone have been applied in the past. This means that based upon the above average for McLean County approximately 25,891 tons had been applied to our project area which shows a need of over 200,000 tons.

In one township where we signed up under agreement 17,500 acres 1,272 had been limed—2,967 tons applied.

In southern Illinois a check was made of four camp areas. Out of 32,061 acres under agreement, all of which needs 3-4 tons of lime, 5,980 acres had been limed—21,809 tons were applied; of the limed land 4,266 acres needed erosion control, 1,623 did not have an erosion problem. Only 118 of the limed acres were in pasture.

In a typical Illinois corn belt area only a little over 7% of the farms had been limed and only 20% of the land limed needed erosion protection.

In southern Illinois 18% of the farms had used some limestone and 71% of the limed area needed erosion protection.

I am citing these widely diverse figures to show that conditions vary but that erosion control work fits into the limestone picture in both cases.

We are encouraging the corn belt farmer to use lime on land where he has formerly used it very sparingly if at all and we are endeavoring to help the southern Illinois farmer get all the value of his limestone by showing him how to keep it on the sloping field instead of allowing it to wash off.

#### Liming Pastures

In one particular, both parts of the state seem the same—only a very slight percentage of the pasture land has been limed. We are almost opening a new field in Illinois in this respect. The liming of pastures can be made a profitable practice as well as a means of controlling erosion and that is just what the S. C. S. is endeavoring to demonstrate in its 18 pasture improvement demonstrations.

About 3821 tons of agricultural limestone

was ground in 14 camp areas in 1935. This work has been carried on with the cooperation of the Soil Conservation Associations.

The limestone is used only upon land that is signed up with the Soil Conservation Service for an erosion control program, and the amount provided for any one coöperator is limited. Because of the condition that much of this land is in, very little of it would be limed unless the farmer was given encouragement.

The three main project areas and the sub-project areas are grinding with their own equipment. The limestone is the property of the Soil Conservation Service and is being used in demonstration work where the co-operator matches the value of the stone with seed-fertilizer, an equal amount of limestone or other materials.

We believe that our grinding program, although it is very small, will stimulate an increased interest in the use of limestone. The success of our program depends upon getting results and we are using as many safeguards as possible to achieve those results.

In closing, I would like to express our appreciation for the cordial relationship that we have had with the State Geological Survey and for the interest in our program that has been expressed by the Midwest Limestone Institute.

#### Free Soil Testing

National Lime and Stone Co., Findlay, Ohio, is offering farmers free soil testing service. Under the Federal Soil Conservation Act, farmers will receive benefit payments for growing clover or alfalfa. These payments will be based on the seed, the amount of lime used and for putting these acres into soil conserving crops.

Farm crops produce at their maximum at the neutral point when the fertilizer and drainage requirements are met. There is a definite falling off of production for the varying degrees of acidity. Land that has been limed in past rotations may be slightly acid, or acid, thus requiring 2 tons of limestone to bring it to the neutral point. Soil that is now neutral requires approximately a ton of limestone per acre per rotation to hold it to the neutral point.

Under the soil testing program soil cartons with directions for taking soil samples are placed in all farm elevators, mills and warehouses in the county. Farmers may return the cartons with the samples to the warehouse where the tests will be made and the liming requirements information given out.

#### Ballast Contract

Pryor-Knight Co., Tampa, Fla., has started producing gravel for ballasting 81 miles of the Atlanta and St. Andrews Bay R. R., at Cottdale, Fla. It is expected to require 2½ years to complete the job.

#### Unity of Action

Portland Sand and Gravel Producers' Association, Portland, Ore., members closed their plants July 17 for an indefinite period as the result of a strike of truck drivers at one member's plant. In a formal statement the producers' association declared the strike to be an "unfair attack" upon this company, and—

"Rather than tolerate or submit to such un-American tactics and conditions, and in order to protect the public, employees and industry, firms engaged in the sand and gravel business are closing their plants for an indefinite period."

#### Protests Special Rate

Yakima Sand & Gravel Co., Yakima, Wash., believes the Northern Pacific railway is granting a special freight rate that is unfair, unreasonable and unprofitable for hauling material for construction of the Roza reclamation unit, and has filed a protest with the state department of public service. Leo S. Ross, president of the Yakima firm, in announcing this move, stated that cancellation of the recently awarded Roza sand and gravel contracts and a call for new bids would save the United States government thousands of dollars.

Mr. Ross charges that the Northern Pacific promised a producer with a plant near Baker, in Kittitas county, to cut the going freight rate from \$1.20 to 35c per ton. At the same time, he says, the Northern Pacific agent in Yakima led him to believe that some unknown special rate would be established for the use of the government only, and that therefore the Yakima firm was handicapped in preparing its bid.

Secretary Ickes awarded two contracts, totaling \$173,631, on June 24 to Woodworth & Cornell, Inc., of Tacoma, and to L. Romano Engineering Corp., Seattle, to supply the Roza sand and gravel. The Woodworth & Cornell firm has its plant in upper Kittitas county.

#### New Sales Office

United States Gypsum Co., Chicago, Ill., has opened a district office in Birmingham, Ala., in charge of Richard Brannon, formerly with the company at Atlanta. The territory included is Alabama, Tennessee, Louisiana, Mississippi and northwest Florida.

#### Nice Contract

Northern Gravel Co., West Bend, Ore., Frank A. Bingham, manager, announces a contract for 38,000 tons from the city of Milwaukee for street repairs.

#### Resumes Production

Crescent Gravel Co., Hersey, Mich., is said to be in production again, after a shutdown of several months.

# Fire Insurance Rates *LOW!*

Materials Handled: SAND and GRAVEL  
and Plant Construction: *All STEEL!*

**H**AVING worked out its river deposit at Mt. Vernon, Ohio, last summer, the Mt. Vernon Sand and Gravel Co. moved its site of operations to Fredericktown, Ohio. Construction of the new plant began in June, 1935, and the structure was ready for operation in October.

## Thorough Stripping

A new all-steel plant was built to work a bank deposit on leased property. The deposit averages from 35 to 40 ft. in depth and contains 45% sand and 55% gravel. A General gasoline-driven shovel with  $\frac{1}{2}$ -yd. bucket is used for stripping and for loading finished products from stock-pile. The overburden averages 6 ft. in depth, but an additional 14 in. of the deposit itself is removed to insure the elimination of all objectionable material.

## Power Scraper

Considerable time and labor were spent in excavating to clear a sufficient area for the

plant, and at present storage is comparatively limited, but will be practically unlimited as the bank is worked out.

A Sauerman 1-yd. power scraper excavates the matrix, which is discharged over an inclined grizzly 9 ft. square with 12 in. openings. The field hopper below the grizzly, by means of an apron feeder, discharges to a 24-in. Columbus belt conveyor. This conveyor is 48 ft. c. to c., and elevates the material up a 30-deg. incline and discharges into a Link-Belt rotary conical screen. This screen is 8 ft. in length, has end diameters of 5 ft. and 34 in. and has 2-in. openings.

Gravel not passing the 2-in. openings passes directly below to a 16x20-ft. Austin-Western jaw crusher, where it is reduced to  $1\frac{3}{4}$  in. and less. A 16-in. Columbus belt conveyor carries the crushed gravel back to the first conveyor, forming a closed circuit, and the crushed gravel passes through the conical scalping screen again.

Material passing the scalping screen is raised by a Link-Belt bucket elevator to a Columbus rotary scrubber. The 47-ft. elevator is rated at 75 tons per hour and is equipped with 14-in. by 12-in. buckets. Wash water is pumped from Owl Creek nearby by means of a 5-in. Gould pump to the  $4\frac{1}{2}$ -ft. by 6-ft. scrubber.

## Grading

Sizing takes place on a 3-ft.x8-ft. triple-deck Simplicity vibrating screen, which sizes the aggregate into No. 3 ( $\frac{3}{4}$  in. to 2 in.), No. 4 (1 in. to  $\frac{3}{8}$  in.) and No. 6 ( $\frac{3}{8}$  to 3-16 in.) highway specification gravel and sand. To make these sizes, the screen is equipped with 3-16-in.,  $\frac{3}{8}$ -in. and  $\frac{3}{4}$ -in. wire mesh with an insertable wire with 1-in. openings for over-size for No. 4 gravel.

When desirable to recrusher the No. 3 gravel, it passes to a 16-in New Holland roll crusher. A 20-ft. rebuilt bucket elevator,



New all-steel plant of the Mt. Vernon Sand and Gravel Co., Fredericktown, Ohio



Another view showing method of stock piling

with 4-in. by 10-in. buckets, elevates the crushed material back to the Simplicity screen.

#### Storage

Sand passes to a 12-ft. Columbus sand drag, with 24-in. blades, after which it passes by a two-way chute either to a bin below or to stock-pile. Three steel Columbus bins of 25 tons each receive the No. 3 and No. 4 gravel and sand, and pea gravel passes direct by conveyor belt to stock-pile.

The No. 3 and No. 4 gravel are stock-piled by means of 90-ft. and 80-ft. c. to c. conveyors, receiving the gravel directly from the bins. A 45-ft. c. to c. conveyor carries pea gravel direct to stock-pile, and a 35-ft. c. to c. swinging conveyor stock-piles the sand.

The plant is designed for a capacity of 60 tons per hour, but operates generally at 40 tons hourly. Motors used are the following:

- 40-hp. G. E. operates hoist.
- 20-hp. G. E. operates jaw crusher.
- 20-hp. G. E. operates pump.
- 15-hp. G. E. operates roll crusher.
- 7½-hp. G. E. operates scalping screen and feed conveyor.
- 3-hp. G. E. operates return conveyor.
- 7½-hp. G. E. operates No. 3 conveyor.
- 5-hp. Master operates No. 4 conveyor.
- 5-hp. Master operates No. 6 conveyor.
- 5-hp. Master operates sand conveyor.
- 5-hp. Master operates sand-drag.
- 7½-hp. Howell operates Simplicity screen.
- 15-hp. G. E. operates scrubber and elevator.

155½-hp. rated.

#### Moves Plant

Grant Smith Construction Co., Seattle, Wash., which bought the Miles City, Mont., plant of the Pioneer Sand and Gravel Co., Seattle, is dismantling the plant and moving the equipment to a pit near Edgar, Mont., in Clarks Fork valley. The Pioneer plant was originally built to supply ballast for the Northern Pacific Ry.

#### Decrease Capital Stock

General Sand and Gravel Co., Klamath Falls, Ore., has filed an amendment to its charter decreasing its capital stock from \$50,000 to \$2,000.

#### Changes Owners

Missouri-Illinois Material Co., St. Louis, Mo., has purchased the Denton Gravel Co. plant, Pacific, Mo. Clyde Denton is general manager in charge operations at Pacific.

#### Shipwreck

Materials Service Corp., Chicago, Ill., suffered the loss of its chartered Diesel motor ship *Material Service* with 15 members of its crew in Lake Michigan on the night of July 29. This ship was especially built about 10 years ago to carry sand and gravel from the company's plant near Lockport on the Chicago drainage canal to yards on Chicago water front. It was designed to be so low in the water as to pass under the drawbridges without having to raise them, which can be done only during certain hours. A description of the ship was published in *Rock Products* at the time it was built.

At the time of its loss it was carrying a cargo of 2000 tons of sand and gravel from Lockport to the company's yard at 92nd St. in the south part of Chicago and was within one-half mile of the breakwater. The lake was moderately rough but there was no storm. The ship capsized so suddenly that a majority of the crew were caught below deck in their bunks and had no chance to save themselves. The cause of foundering had not been determined at this writing.

#### Fire Losses

Ohio Gravel Co., Cincinnati, Ohio, suffered a loss of approximately \$35,000 in the partial destruction of its Cleves plant by fire on July 11. Fred W. Cornuelle, president of the company, informs *Rock Products* that the plant was quite busy at the time, but by shipping from other of the company's plants, and with help from the Western Hills Sand and Gravel Co., all customers have been taken care of. Completed drawings for a new plant had already been made, and instead of making repairs, an entire new plant is under construction, to be ready for operation by October 1.

Keystone Sand and Gravel Co., Dayton, Ohio, suffered a \$75,000 loss July 13, through destruction of its plant by fire. Extensive improvements had recently been made, using structural steel in place of former wooden structures, but the wooden structures had not yet been removed. Rebuilding was begun at once, and the plant is expected to be in operation again in six weeks. Edward Kammer is president and Wayne Lee, secretary-treasurer.

Northern Gravel Co., Muscatine, Iowa, plant was damaged to the extent of \$50,000 by fire on July 15. The fire started in, and was principally confined to, the drying plant. The loss was covered by insurance and the plant is being rebuilt.

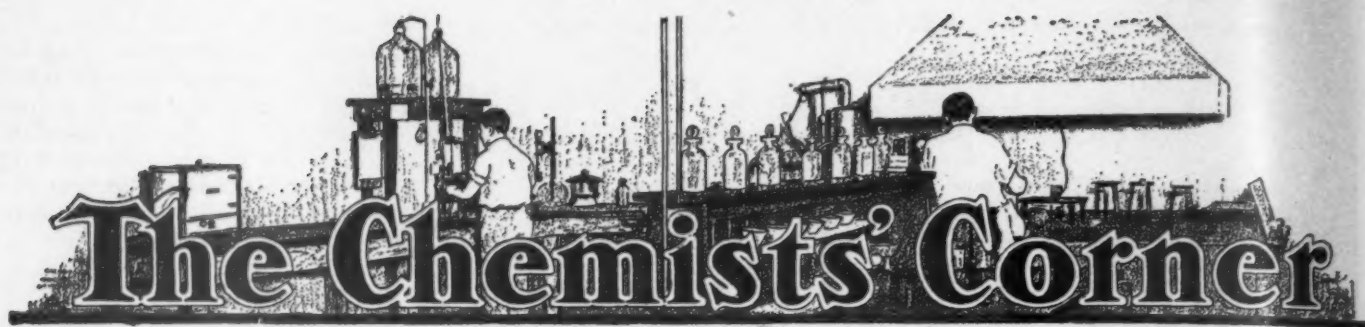
Newport Sand and Gravel Co., Rochester, N. Y., plant was destroyed by fire on June 30.

#### Highway Dust—Silicosis

Alabama state highway chief engineer, H. H. Houck, is using a new argument for paved highways. He is quoted as saying: "Silica abounds in Alabama. It is the basic element in our white sand and sand-clay roads. I'm firmly convinced that the presence of silica in large quantities and the prevalence of respiratory disorders are related. Paving our roads will be laying the foundation of health."



Site of Mt. Vernon Sand and Gravel Co. Note gravel bank



## A DIRECT METHOD for the DETERMINATION of ALUMINUM in PORTLAND CEMENT

By W. R. Chandler

Chief Chemist, Idaho Portland Cement Co.,  
Inkom, Idaho

AS OUR KNOWLEDGE of concrete behavior grows, the part played by tricalcium aluminate in portland cement and its effect upon the quality of the resultant concrete is becoming increasingly important. It is a matter which has occupied the attention of government engineers for several years now, particularly as reflected in the specifications for portland cement on such projects as Boulder Dam, Grand Coulee Dam and other work where massive structures are involved. This is now of even greater importance to cement chemists since the issuance of the recent Proposed Revisions of Federal Specifications, all of which specify definite  $Al_2O_3$  limits. It is even reasonable to assume that similar specifications may be expected to evolve sooner or later from other agencies than federal.

Cement plant operators may not agree or sympathize with the limitations of these specifications, but the fact remains that if they wish to continue to furnish cement on works governed by these limits they must find ways and means to meet them. It is therefore established as a premise that they must be able to determine in their own laboratories whether or not their product will meet these specifications, before the material is submitted for bid or use. To be sure, the agencies who do issue these specifications also furnish the methods by which the constituents shall be determined, and as long as these methods are followed, and the results obtained are within the specified limits, the material may be considered acceptable. It seems particularly fitting at this time, however, that cement chemists should have available a direct method for the determination of aluminum by which a closer approximation of  $CaA$  content may be estimated than has been heretofore possible.

Even though the minor constituents of portland cement may be very carefully determined, it is not within the bounds of reasonable laboratory procedure that this would be done for every sample of cement which is analyzed in plant routine. If it is

not done, the calculated compound composition of that cement may be incorrect to a greater or lesser degree. It becomes just as important that we find the aluminum value with the same degree of precision by which we now determine silica or lime, because an incorrect determination of any one component materially affects the calculation of all the major compounds of portland cement, with the exception of  $C_4AF$ . An incorrect determination of iron alone would materially affect the calculation of this latter compound.

Although we may occasionally determine all the minor constituents of an  $R_2O_3$  precipitate it does not necessarily follow that these will always be there in a subsequent product of the same mill in the same proportion or kind. Furthermore, a determination of zirconium, for example, is not one to place in the hands of every cement plant laboratory assistant. Yet, in view of the wide range of raw materials used for cement manufacture, this element or even those more rare and more difficult of determination may be present in an appreciable amount and counted as aluminum.

The method which is discussed in this article can not be noted in any way for its originality. The author freely concedes that he has adopted the discoveries of others, and arranged them in such a manner as to be suitable to a determination of aluminum in portland cement. Even with the fundamental principles firmly established, it has required a great deal of time and effort to develop a method which appears to be accurate, reasonably fast, and not expensive of application.

### Test Methods

Two procedures have now been developed, one being gravimetric and the other volumetric. Both appear to be equally satisfactory although the latter is somewhat faster. The method of procedure is as follows:

A one gram sample of the cement or clinker, ground to the usual fineness, is

weighed into a 250-ml. beaker and to it is added 25 ml. of cold water in such a way that the material is completely dispersed and no lumping occurs; 5 ml. of concentrated  $HCl$  is now added (Note 1), and the beaker is placed on the moderately hot part of the stove. The material should be completely dissolved in five minutes and the solution is then transferred to a 100-ml. volumetric flask with cold water washings and diluted to within about 12-15 ml. of the mark. The flask is now cooled under the tap with shaking until its temperature is a little above the standard temperature marked on the flask (usually 20 deg. C.), and 7 ml. of a 6% cupferron solution in water is added to the flask without shaking or stirring (Note 2). The solution is now further diluted to within 0.5-1 ml. of the mark and placed in a bath maintained at the standard temperature of the flask. After the flask and solution have reached standard temperature it is removed and the solution carefully brought exactly to the mark. It is now inverted twice, with the flask closed, in order to mix its contents, and the solution is poured into a dry 250-ml. beaker. To this is added a paper pulp filtration accelerator which has been broken into small pieces.

The solution is now stirred on a mechanical stirring machine for two or three minutes until the paper is completely disintegrated and the precipitate is coagulated. The solution is now filtered through dry double No. 3 Munktell 15-cm. filters in a 3-in. funnel, the filtrate being caught in a dry 150-ml. beaker. *No washing of the residue in the paper is done.* The filtrate should be again brought to standard temperature without any dilution, and exactly 50 ml. of it is transferred to a 250-ml. beaker with a Normax grade pipette. To the solution is added 20 ml. of 60% perchloric acid, which is mixed with the solution, and the beaker is placed on the hot part of the stove and covered with a raised cover glass.

The solution will soon turn to a coffee color and as it approaches the fuming point

of the perchloric acid, the excess cupferron will begin to char and be driven off (Note 3) and the dissolved silica will separate out. As soon as the organic matter has been completely destroyed and the solution is fuming copiously and freely, the beaker is removed from the stove to cool. When it is cool enough to handle it may be diluted with boiling water to 50 ml. and vigorously stirred, breaking up the silica as much as possible (Note 4). The solution is transferred to an 11-cm. No. OA Munktel suction filter, the filtrate being received in a clean 400-ml. beaker. The beaker, with the residual silica, is scrubbed out with hot 1-1 HCl and washed into the filter. The residue in the filter is washed vigorously once with the hot 1-1 HCl, and finally four times with hot water. The filtrate now has a volume of about 150 ml.

To the filtrate is added one drop of a methyl red solution and ammonia, until one drop just changes the color of the solution to yellow. To this is now added concentrated HCl, drop by drop, until the solution is again red and the precipitated  $Al(OH)_3$  is just dissolved (Note 5). Then 5 ml. of 50% acetic acid is added and 15 ml. of a 3% 8-hydroxyquinoline solution (Note 6). The solution is diluted to 275 ml. with hot water, and 20 ml. of a filtered, nearly saturated solution of ammonium acetate is slowly added with stirring, precipitating the canary yellow  $Al(C_8H_6ON)_3$ . The solution is gently boiled for 5 minutes (Note 7) and set aside to cool and settle for 30 minutes. The precipitate is filtered through a prepared and weighed Gooch crucible (Note 8), scrubbing out the beaker carefully in which the precipitation took place. The residue in the crucible is washed several times with cold water and dried at 118 deg. C. for two hours before the final weighing.

The factor for converting the weight of the dried precipitate to  $Al_2O_3$  is 11.1 and this must be doubled as the precipitate represents 0.5 gram of cement sample.

#### Volumetric Procedure

##### Solutions required:

- (a) Sodium Thiosulphate Solution: 41 grams of  $Na_2S_2O_3 \cdot 5H_2O$  dissolved in 1 liter of water.
- (b) Potassium Bromide-Potassium Bromate Solution: Dissolve 32 grams of KBr and 9 grams of  $KBrO_3$  in liter of water.
- (c) Potassium Iodide Solution: A 25% solution of KI in water.
- (d) Starch Solution: To 100 ml. of boiling water add a cold solution of 1 gram of soluble starch in 5 ml. of water, cool, add a cold solution of 1 gram of NaOH in 10 ml. of water. Mix thoroughly.

The value of the KBr-KBrO<sub>3</sub> solution in terms of the  $Na_2S_2O_3$  is obtained as follows: To 200 ml. of water in a 500 ml. Erlenmeyer flask is added 15-20 ml. of the KBr-KBrO<sub>3</sub> solution from a burette. To this is then added 20 ml. of concentrated HCl and 10

ml. of the KI solution. Titrate at once with the  $Na_2S_2O_3$  solution until the yellow color of the liberated iodine is faint and add 2 ml. of the starch solution. Continue titrating to the disappearance of the blue color. The ratio of the two solutions is now calculated to: 1 cc.  $Na_2S_2O_3 = x$  cc. KBr-KBrO<sub>3</sub>. With the concentrations given above the value for  $x$  will be very nearly 0.5.

Standardization of KBr-KBrO<sub>3</sub> solution: For this purpose the Eastman Kodak Co. No. 301 Resublimed Aluminum Chloride will be found satisfactory. Analysis of this product in this laboratory has indicated 100% purity; 0.0850 gram of this material is accurately weighed into a 400-ml. beaker and dissolved in water (Note 9). The solution is now diluted to 150 ml., its acidity is adjusted, and the precipitation of the aluminum quinolate is made in exactly the same manner as described in the gravimetric procedure above. After the required 30 minutes settling time has elapsed the solution is filtered through a No. OA 11-cm. Munktel filter. The beaker is rinsed into the filter with cold water and the residue in the filter is washed five or six times with water. Care must be taken in washing, as the precipitate has a tendency to "crawl" over the edge of the paper.

The beaker in which the precipitation was made, is washed down with hot 1-1 HCl and scrubbed with a policeman to loosen and dissolve the precipitate which may be adhering to it. A 500-ml. Erlenmeyer flask is now placed under the funnel and the residue in the filter is agitated and dissolved with the hot 1-1 HCl wash bottle until it has completely dissolved. The beaker is also rinsed into the funnel with hot water and the paper is further washed with water until it is sure that all dissolved precipitate has been transferred to the flask. The solution is diluted to 200 ml. and cooled under the tap to room temperature; 15 ml. of concentrated HCl is added and from the burette 24.5 ml. of the KBr-KBrO<sub>3</sub> solution is run in and the solution shaken for 30 seconds; 10 ml. of the KI solution is added and the solution is titrated with the  $Na_2S_2O_3$  until the yellow color of the liberated iodine is faint. 2 ml. of the starch solution is then added. The titration is slowly continued until the starch indicator color has disappeared and the solution is again a yellowish green color. To this is added, a drop at a time, the KBr-KBrO<sub>3</sub> solution until one drop changes the color back to the blue side (Note 10). This is now brought very slowly back to the yellow green side with  $Na_2S_2O_3$ . The burettes are now read and the amount of  $Na_2S_2O_3$  used is calculated to its equivalent amount of KBr-KBrO<sub>3</sub> and subtracted from the amount of KBr-KBrO<sub>3</sub> used. From this is calculated the value per cc. of the KBr-KBrO<sub>3</sub> in terms of  $Al_2O_3$ .

#### Method for Cement or Clinker

The procedure is the same as described in the gravimetric method up to the point where the aluminum quinolate precipitate

is filtered. From this point the procedure as outlined under Standardization of KBr-KBrO<sub>3</sub> above is followed, applying the value of the standard solution already found.

A prior knowledge of the probable amount of  $Al_2O_3$  present in any sample is of advantage so that the approximate amount of KBr-KBrO<sub>3</sub> necessary to react with it may be calculated; 0.5-1 ml. more than this may then be added and the excess back titrated with the  $Na_2S_2O_3$  solution.

#### Experimental Results

In this laboratory a sample of cement was set aside for experimentation and after the method had been developed to a point where satisfactory checks could be consistently obtained, the alumina was determined with an average result of 6.29%; 0.07% was considered to be the maximum allowable deviation for checking.

A blank was run on the reagents, and it resulted in less than 0.01% correction, which may be safely ignored.

To a one gram sample of the same cement, exactly 0.1 gram of the No. 301 Aluminum Chloride was added, resulting in an average weight of 0.3496 grams aluminum quinolate being obtained on several trials. This is equivalent to 0.0388 grams  $Al_2O_3$  as representing the added  $AlCl_3$ . The theoretical yield of  $Al_2O_3$  from 0.1 gram of pure  $AlCl_3$  would be 0.0382 grams.

The fact that the method of procedure might be determining minor constituents also was next considered, and 0.2 gram of the following salts was added to a one gram cement sample with the results for alumina as given:

Manganous Sulphate .....	6.28%
Sod. Ammonium Phosphate .....	6.27
Barium Chloride .....	6.31
Magnesium Chloride .....	6.29
Boric Acid .....	6.28

Running single samples of cement only, the complete gravimetric procedure can easily be accomplished in four and a half hours. The volumetric method used 2 hours and 45 minutes for a single determination.

An ordinary standard analysis of the cement was now made, reporting the  $Al_2O_3$  as the difference between  $R_2O_3$  and  $Fe_2O_3$ . We have, therefore, two sets of analyses which we may compare:

	Standard	8-Hydroxy-quinoline
Silica	20.62%	20.62%
$Fe_2O_3$	2.66	2.66
$Al_2O_3$	6.92	6.29
CaO	64.60	64.60

Assuming 1.0% free lime, 1.5%  $SO_3$ , and calculating the compound composition according to U. S. Bureau of Reclamation Technical Memorandum No. 309, we have:

	Standard	8-Hydroxy-quinoline
$C_3S$	47.8%	51.9%
$C_2S$	23.0	20.1
$C_3A$	13.75	12.00
$C_4AF$	8.1	8.1

### Conclusion

In retrospect we may now consider the apparent worth of the method as developed.

From the published literature on the subject we know that the following elements are precipitated by cupferron in an acid solution: Iron, Titanium, Zirconium, Tin, Columbium, and Tantalum. According to Bureau of Standards Research Paper No. 813 Beryllium is not precipitated by 8-hydroxyquinoline in an acid solution. The major constituents of portland cement, silica and lime, do not interfere. By actual trial we have found that Manganese, Phosphorus, Barium, Magnesium, Boron, Sulphate, and Sodium do not influence the result. Any sulphides would undoubtedly be oxidized by the perchloric acid treatment and potassium would probably not interfere if sodium did not. No reference can be found for a reaction between vanadium salts and 8-hydroxyquinoline, and as a supply of this element was not easily available, no trial was made.

It is quite possible that those cements manufactured from slags of one kind or another might give trouble, due to their metaliferous character.

We feel, however, that the method has considerable merit and that it will be applicable to the vast majority of portland cements.

\* \* \* \* \*

**Note 1:** This concentration of acid should be carefully adhered to. A stronger concentration will cause an unsatisfactory precipitation of metals thrown out by cupferron later, and a weaker concentration may not cause complete solution of the cement.

**Note 2:** This has been found to be the proper amount of reagent necessary to precipitate the iron, titanium, etc., when they occur in the amount existing in the sample of cement experimented with. A large excess of cupferron will cause a white turbidity in the filtrate when these metals are removed by filtration.

**Note 3:** In spite of this action, no single experience of explosion or fire has been encountered after a great many oxidations of this nature.

**Note 4:** It has been found that it is not necessary to boil this dilution to get soluble salts into solution as long as very hot water is used and the solution well stirred. On boiling the solution at this point, it is almost sure to bump with explosive violence unless stirred continuously.

**Note 5:** The presence of any  $Al(OH)_3$  should be carefully checked at this point to be sure that it is all in solution.

**Note 6:** 3% 8-hydroxyquinoline in a 20% acetic acid solution, carefully filtered before storing in stock solutions.

**Note 7:** The solution has a strong tendency to reach a frothy boiling and must be carefully watched to prevent boiling over.

**Note 8:** Several other means of determining the weight of the precipitate were attempted, but were not found as satisfactory as the Gooch method. Among these were filtering on paper and ignition of the residue to oxide, and filtering through alundum crucibles with subsequent drying or ignition.

**Note 9:** The reaction of this substance with water is very violent and the beaker should be covered, and the dissolving water added slowly and cautiously.

**Note 10:** The characteristic starch blue end point is somewhat masked in this reaction by the original yellow-green color of the solution, so that it becomes more of a muddy green than blue. A little practice will soon enable one to distinguish the end point. The reaction of the  $Na_2S_2O_3$  is also slow, so that the end point is easily overstepped. However, it may be quickly brought back again with the  $KBr-KBrO_3$  solution.

### Determination of $SO_3$ in Cement

By D. R. Williams  
Monolith Portland Midwest Co., Laramie, Wyo.

THE ACCOMPANYING ILLUSTRATION shows an apparatus built in our laboratories for the determination of  $SO_3$  in cement. It is similar to the Parr Turbidimeter but eliminates the personal element in the reading of the end point.

The solution to be tested, made up the same as for the Parr determination, is put in the glass container *A*. Before the solution



Apparatus for rapid testing for  $SO_3$  in cement

is tested the apparatus is checked with the standard cobalt glass *B*. The light and reflector are inside the base *C*. To adjust the apparatus before taking the reading the cobalt glass is placed at the top of the tube on *C*. The photronic cell *D* (in a tight fitting leather cup) is placed over the glass and the current from a 6-volt storage battery is then adjusted by means of a rheostat to give a micro-ampere reading of 40. *A*, containing the solution to be tested, is then placed inside the tube and the photronic cell put in place as before and micro-ampere reading taken. The intensity of the light passing through the solution, registered by the photronic cell on the micro-ammeter shows the comparative turbidity of the solution. This is indirectly proportional to the barium sulphate precipitation. From a chart

the  $SO_3$  percentage is read. No check readings are necessary and the results check very closely with the gravimetric determinations.

The entire operation, including the weighing of the sample and cleaning of the apparatus, requires only 15 minutes. The instrument in the picture has been used more than three years.

### Expansion

Monsanto Chemical Co., St. Louis, Mo., contemplates expansion of Swann Chemical Co.'s plant at Anniston, Ala.; preparation underway for development of land containing phosphate deposits south of Columbia, Tenn.; company has contracted with TVA for power for use in production of phosphoric acid.

### Sand-Lime Brick Production and Shipments

THE FOLLOWING DATA are compiled from reports received direct from producers of sand-lime brick located in various parts of the United States and Canada.

Eleven active sand-lime brick plants reported for the month of June, this number being two more than that reporting for the month of May, statistics for which were published in July.

#### Average Prices for June

Shipping Point	Plant Price	Delivered
Pontiac, Mich. ....	\$11.00	\$13.50
Grand Rapids, Mich. ....	10.50	.....
Detroit, Mich. ....	.....	13.50
Mishawaka, Ind. ....	9.25	.....
Syracuse, N. Y. ....	14.00	16.00-20.00
Saginaw, Mich. ....	10.50	.....
Madison, Wis. ....	11.50	13.00
Toronto, Ont., Can. ....	12.00	13.50

#### Statistics for May and June

	May†	June
Production .....	2,278,050	3,689,615
Shipments (rail) .....	137,000	264,050
Shipments (truck) .....	2,162,609	3,234,710
Stocks on hand .....	1,083,991	1,339,696
Unfilled orders .....	1,380,000	2,945,000

† Nine plants reporting; incomplete, three not reporting unfilled orders.

\* Eleven plants reporting; incomplete, two not reporting unfilled orders.

#### Sand-Lime Block

One producer reported production of 21,-250 sand-lime block in June, with truck shipments aggregating 20,105. The average price of the block was 11c F.O.B. plant, and 13c F.O.B. job. The block come in 8-in., 9-in. 10-in., 12-in., and 13¼-in. sizes. A two-cored backup block 8½x4x4½ in. is also being manufactured.

### Sand-Lime Brick for Armory

Sioux Falls Pressed Brick Co., Sioux Falls, S. D., has received an order for 270,000 sand-lime brick to be used for an armory at Madison, S. D.

### Profitable

Cebu Portland Cement Co., Naga, Cebu, P. I., owned by the government of the Philippine Islands, is reported to have earned \$150,000 in 1935. It has no competition except from foreign plants.

### New President

Universal Atlas Cement Co., Chicago, Ill., announces the election of Blaine S. Smith as president, effective September 1. He succeeds B. F. Affleck, who retires under the United States Steel Corporation's pension plan. Mr. Smith was vice-president in charge of sales of the Universal Portland Cement Co. until 1928, when he resigned to become president of the Pennsylvania-Dixie Cement Corp., at New York City. This position he has now resigned to return to Universal Atlas.

Mr. Smith joined the sales staff of the Universal in 1908 and became general sales manager in 1915. One of the portraits herewith was published in Rock Products at that time, and shows the future president as he looked some time between 1908 and 1915. The other shows him after some years of executive work. He was elected vice-president of Universal in 1926.

B. F. Affleck will devote his time to private interests, although his many friends and acquaintances in Chicago and elsewhere hope that he will continue many of his civic activities. Few business men have wider interests or exert more influence for good than Mr. Affleck.



Matzene photo

Blaine S. Smith earlier in his career

### New Vice-President

Canada Cement Co., Ltd., Montreal, Que., has elected F. B. Kilbourn vice-president to succeed the late H. L. Doble. Mr. Kilbourn retains his duties as general superintendent. George A. Russell, formerly comptroller, succeeds Mr. Doble as secretary-treasurer.



Harris and Ewing photo

B. F. Affleck, retiring president of Universal Atlas Cement Co.

### Government May Buy

Rizal Cement Co., Binangonan, P. I., will probably be purchased by the Philippine Island national government, according to Manila newspapers. The National Development Co., government agency, has owned and operated the Cebu Portland Cement Co. plant for many years.



A recent photograph of Blaine S. Smith

### New Superintendent

Lone Star Cement Corp., Bonner Springs, Kan., plant is now in charge of W. W. Deadman as superintendent, succeeding R. J. Elledge, who died June 27. Mr. Deadman has been 11 years with International. In recent years he has been with the Lone Star Alabama plants.

### New Sales Manager

Bessemer Limestone and Cement Co., Youngstown, Ohio, announces the appointment of Frank B. Warren as general sales manager and Frank R. Peck, assistant general sales manager, effective August 1. Mr. Warren comes from Chicago, Ill. Mr. Peck has been connected with the company for a number of years.

### Official Retires

Standard Portland Cement Co., Painesville, Ohio: Clifton N. Windecker, vice-president, has announced his retirement as vice-president in charge of manufacturing of the Diamond Alkali Co. He was president of the Thunder Bay Quarries Co., Alpena, Mich., and vice-president of the Standard Portland Cement Co., subsidiaries of Diamond Alkali Co. Mr. Windecker spent 37 years in the alkali industry, and built the Painesville plant. He is succeeded as general manager in charge of all manufacturing operations by J. C. Hobbs, with G. S. Rutherford as assistant.

### Returns to Harness

Pennsylvania-Dixie Cement Corp., New York City, announces that John A. Miller, chairman of the board of directors, has been elected president, to succeed Blaine S. Smith, who resigned to become president of the Universal Atlas Cement Co. Mr. Miller has been actively connected with and well known in the industry for 36 years, first as president of the Dexter Portland Cement Co. and the Clinchfield Portland Cement Corp. prior to the formation of Pennsylvania-Dixie, and since then as president and chairman of the board, respectively, of the Pennsylvania-Dixie Cement Corp.

### Promotions

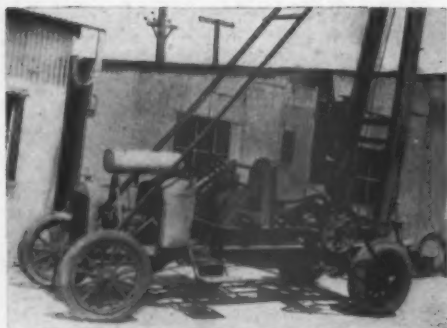
Victor N. Roadstrum has been elected chairman of the board of directors of the Pennsylvania-Dixie Cement Corp., succeeding Mr. Miller. He has been associated with the cement industry for many years and is a director of many other corporations.

George Kilian, who has been acting secretary and treasurer, has been appointed assistant to the president.

Walter S. Wing, general sales manager, has been promoted to vice-president and elected a member of the board.

Wm. H. Klein, general operating manager, has been promoted to vice-president and elected a member of the board.

# HINTS AND HELPS FOR SUPERINTENDENTS



*Drill rig mounted on truck chassis*

## Home-Made Drill Rig

**P.** J. WEISEL, INC., silica sand producers, whose plant is near Corona, Calif., wished to prospect a deposit with a view to putting a plant upon it at some time in the future. Having men skilled in drilling in the company's employ, a drill rig was made at the plant and operated by these men with results that were satisfactory in every way.

A second-hand light truck chassis and motor were utilized by placing a frame of channel irons on it to hold the machinery. Almost all the parts were such as could be bought from dealers. The remaining parts were made in the company's machine shop,

where the fitting and assembling were done.

Power is taken from the rear axle, the rear of the truck being jacked up when drilling is going on. For drilling, the point of the bailer was sharpened and covered with "Studite" to take the wear. The bailer was made from a 12 ft. piece of 5-in. oil well casing.

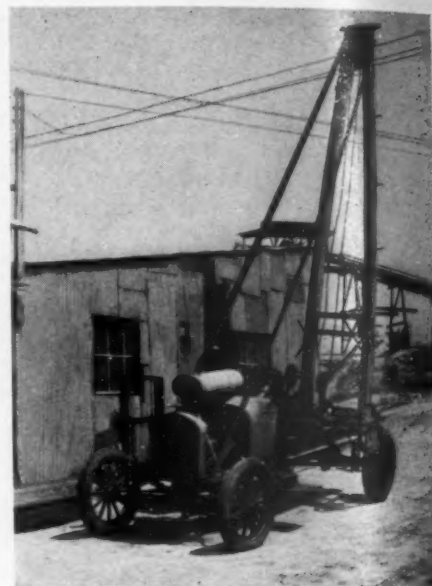
Holes were sunk 100 ft. with no difficulty. The water level was not found, and the driller poured in a few buckets of water every time the bailer was emptied. The material of the deposit is a hard pan of fine siliceous gravel, practically all passing ½-in. round hole, or perhaps it might be called a coarse sand. About 1,000,000 sq. ft. were prospected in this way.

## Air Compressor Used After Hours Keeps Power Down

By Ross Wheelton  
Aldershot, Ont.

**A**T A LOCAL crushed stone plant for the past two years a portable air compressor has been in use for rock drilling. The high cost of fuel, coupled with starting troubles on cold mornings, set the plant owners thinking about some method of putting in an electrically driven stationary machine.

This could easily be done, but would en-



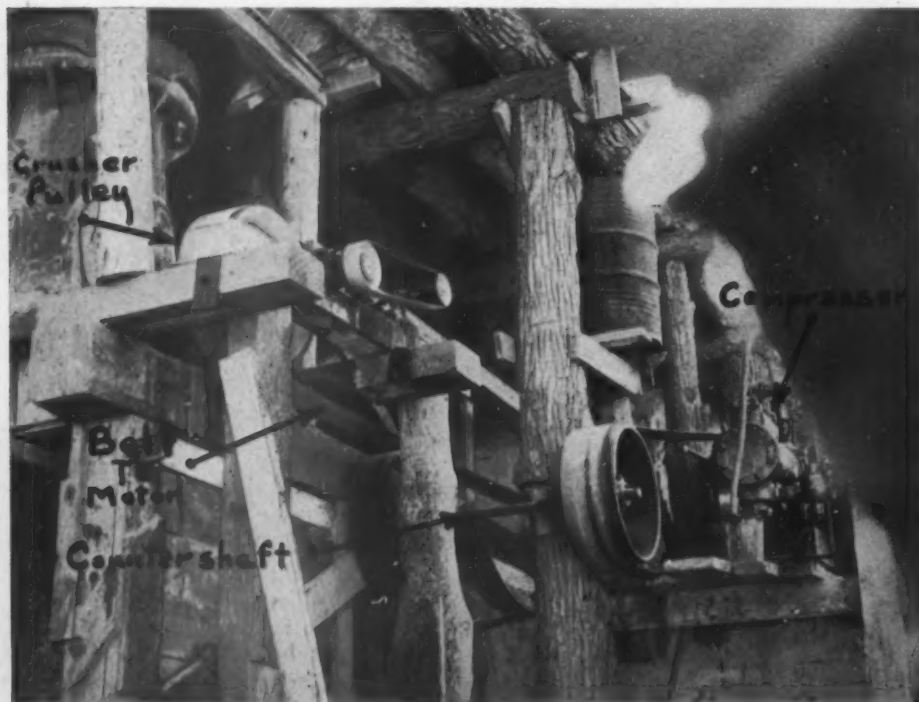
*Another view of drill rig*

tail the cost of another motor and, what is far worse, would boost up the connected load rating and the peak load on which the power company bases its service charge. A way was therefore sought which would keep the peak down, the only extra power cost being for the extra current consumed.

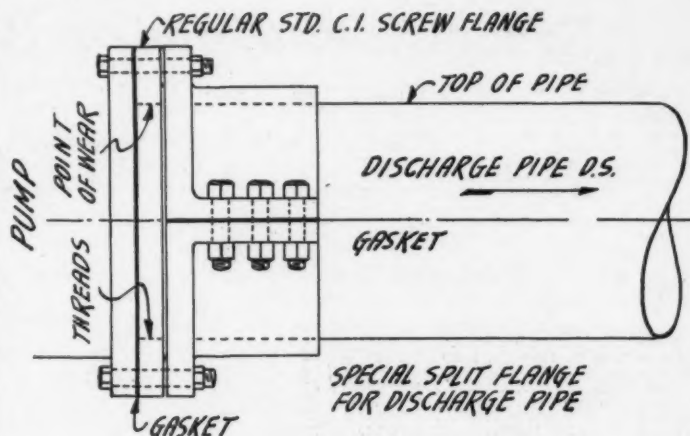
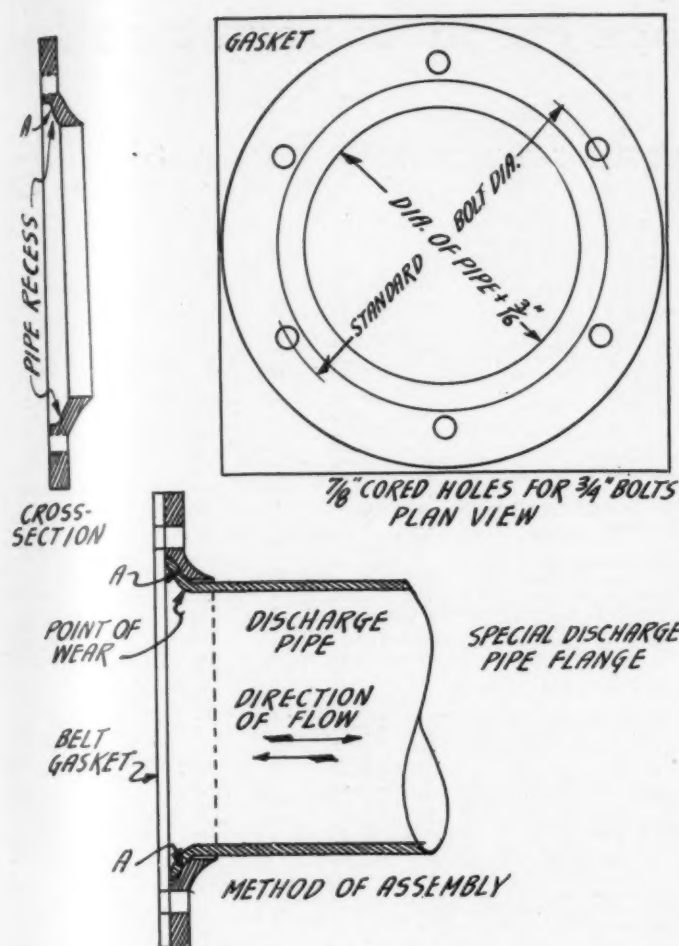
The problem was solved by the layout shown in the accompanying illustration. The compressor was placed to the side and on a lower level than the crusher. A countershaft was mounted below the crusher drive pulley, two pulleys being placed on this shaft, one directly in line with the belt from the motor to the crusher and the other connected by a belt to the compressor drive pulley, this belt being left on all the time. Another belt is fitted between the other countershaft pulley and the motor. When the compressor is to be run, the crusher drive belt is removed from the motor and the belt from the countershaft put in its place, a sliding base on the motor taking up the slight difference in belt length that there may be.

This installation is simple, and makes it impossible to run both machines at the same time, which would run the power bill up.

In addition the cost of another motor and starter is saved. One of the quarrymen starts work a couple of hours later in the morning and when the plant stops at night he changes the belt and drills for a couple of hours, thereby keeping up the drilling schedule.



*Plant layout designed to keep power peaks down*



Left: Various views of special steel flange for flexible and dependable pipe coupling

Right: Split flange and skirt bolted on with regular screw flange

the end of the pipe. The skirt was made of such a length, that when pulled snugly down on the pipe, it cannot be slipped along the pipe. When a pipe was installed back of the pump, with this split flange reinforcing it, the pipe would wear out, and develop blisters on the under side, or blow out, before it would have to be replaced. After the threads were cut out, the split flange had to hold the pipe, which it was capable of doing, as the fine sand that had worked in and around the flange had set. The pipe may be made to last longer by turning it around, but every time it is unbolted, the seal between the flanges is broken; and as the threads become worn on the pipe, it is harder to secure the proper joint; so we always left the pipe in position till it was worn out on one side.

## Dredge Pipe Couplings

By W. C. Torbett, Jr.  
Austin, Tex.

**D**UE TO THE ABRASION of sand and gravel, the items of repairs and replacements are always of importance. In dredging this material, the ends of the discharge pipes, against the flow of material, are continually being worn off; so the method of coupling pipes together is worthy of consideration.

The rubber sleeve connection is very good, but this makes a rather expensive connection. The cast iron or steel, screwed flange is good only as long as both the threads on the flange and the pipe are good. When the screw flanges are in the line, it takes too long to inspect them, by unbolting the flanges; so they are used until they break apart, the pipe coming out of the flange. This causes so much delay and lost time, that we developed another type of flange. This flange, made of steel, has some flexibility, thus taking the shock of the line, without breaking. It is cheaper than the screw flange, as there is no machine work, and gives warning before it causes a shutdown. In fact, properly installed, it will not cause a shutdown, as the trouble can always be made to make the shift, and then repaired.

A cross-section of the flange is shown, and the method of coupling it in the pipe line. After the pipe flange is put over the pipe, the pipe is heated by an acetylene torch and

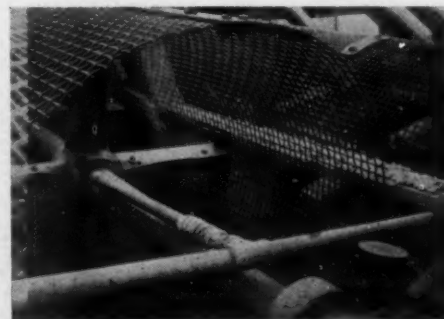
peened back into the recess marked "A" in the flange. A rope gasket is then put in place, between the pipe and flange. Old belting makes an ideal gasket between the two halves of the flange. Six  $\frac{3}{4}$ -in. x 6-in. bolts, threaded down, are used to bolt the flanges together. These long bolts enable you to slip a bolt in and pull the pipe into alignment, and by the long threads, you do not have to change bolts, after the pipe is nearly in place.

As there are no machined faces on these flanges, when they are first placed in the line, they will leak a little during priming of the pump, if no flap valve is used. After the pump has been primed, and a load put on the pump, fine sand will get in all the places at the joint, and there will be no further trouble from leaks. As the only tools needed to put on or repair these flanges are two wrenches, and an acetylene torch, which all gravel pits have, it is a simple matter to couple up a line with these flanges. The expense of putting on screw flanges, or of having pipe rethreaded, is saved; so these flanges have been well worth their cost.

The pipe just back of the pump was always a problem, due to the threads wearing out, until we made a special flange for it. This pipe is expensive to replace, as it is usually double strength; so we made a split flange and skirt, as shown in the second sketch, and bolted it to the pump, through a regular screw flange, screwed on

## Protection for Spider

**T**O PREVENT EXCESSIVE WEAR on the spiders of revolving screens, a simple guard can be placed on the arms of the spider, as shown in the accompanying view. The guard is a piece of sheet metal the same length as the arm, and wide enough to permit its covering three sides of the arm with some excess to permit passing bolts through. It is then bolted in place as shown, with the open side toward the lower end of the screen. When the guard becomes worn, due to the continued action of the stone in the screen, it can easily be removed and another put in its place with very little delay. The guard shown is on one of the revolving screens of the Fontana, Wis., gravel plant of the Moulding-Brownell Corp.



Sheet metal guard on arm of spider

## Recent Quotations on Rock Products Securities

Stock	Date	Bid	Asked		Stock	Date	Bid	Asked	
Allentown P. C., com. <sup>47</sup> .....	7-27-36	4	6		Monolith P. C., com. <sup>9</sup> .....	7-16-36	3½	4	
Allentown P. C., pfd. <sup>47</sup> .....	7-27-36	7	9		Monolith P. C., 3% pfd. <sup>9</sup> .....	7-16-36	8½	7½	
Alpha P. C., com. <sup>48</sup> .....	7-24-36	24½	actual sale	.25 (qu.) July 25	Monolith P. C., units <sup>9</sup> .....	7-16-36	16½	18	
American Aggregates, com. <sup>48</sup> .....	7-16-36	1	2		Monolith Portland Midwest, pfd. <sup>9</sup> ..	7-16-36	3	8½	.25 (ac.) Aug. 1 <sup>st</sup>
American Aggregates, pfd. <sup>48</sup> .....	7-16-36	4	6						
American Aggregates, 6's 1st mtg. 3/8's, 1945, new bonds <sup>48</sup> .....	7-16-36	50	53						
American Aggregates, 6's, 1943, old bonds <sup>48</sup> .....	7-16-36	50	.....		National Gypsum, A, com. <sup>47</sup> .....	7-27-36	46	47	
Arundel Corp., com. <sup>47</sup> .....	7-27-36	17	actual sale		National Gypsum, 1st pfd. <sup>47</sup> .....	7-27-36	102	103	
Ashgrove L. & P. C., com. <sup>47</sup> .....	7-27-36	11	15		National Gypsum, 2nd pfd. <sup>47</sup> .....	7-27-36	15	16	
Ashgrove L. & P. C., pfd. <sup>47</sup> .....	7-27-36	95	100		National L. & S., 6½'s, 1941 <sup>47</sup> .....	7-27-36	90	95	
					Nazareth Cement, com. <sup>47</sup> .....	7-27-36	6	7	
					Nazareth Cement, pfd. <sup>47</sup> .....	7-27-36	50	55	
Bessemer L. & C., Class A <sup>47</sup> .....	7-27-36	4½	5½		Newaygo P. C., 7% cum. pfd. <sup>47</sup> .....	7-27-36	50	60	
Bessemer L. & C., 1st 6½'s, 1947 <sup>48</sup>	7-16-36	83	.....		New England Lime, units <sup>44</sup> .....	7-16-36	13	.....	
Bessemer L. & C., cert. of dep., 1947 <sup>48</sup> .....	7-16-36	84	85		N. Y. Trap Rock, 1st 6's, 1946.....	7-25-36	81	81	
Boston S. & G., com. <sup>47</sup> .....	7-16-36	¾	1½		N. Y. Trap Rock, 6's, stamped, 1946	7-27-36	82½	actual sale	
Boston S. & G., new 7% pfd. <sup>47</sup> .....	7-16-36	8	10		N. Y. Trap Rock, 7% pfd. <sup>48</sup> .....	7-16-36	60	.....	
Boston S. & G., 7's, 1939 <sup>47</sup> .....	7-16-36	70	.....		North Amer. Cement, 1st 6½'s, 1953 <sup>47</sup> .....	7-27-36	36	37	
					North Amer. Cement, 6½'s, 1943 <sup>47</sup> .....	7-27-36	92	94	
Calaveras Cement, com. <sup>48</sup> .....	7-27-36	5½	5½		North Amer. Cement, 6½'s, 1940 <sup>47</sup> .....	7-27-36	65	68	
Calaveras Cement, 7% pfd. <sup>48</sup> .....	7-27-36	88	92	1.00 (ac.) Sept. 1	North Amer. Cement, "A" pfd. <sup>47</sup> .....	7-27-36	2½	3½	
California Art Tile, A <sup>48</sup> .....	7-16-36	16½	17½		North American Cement "B" <sup>47</sup> .....	7-27-36	4	5	
California Art Tile, B <sup>48</sup> .....	7-16-36	3½	4		North Shore Mat. 1st 6's <sup>47</sup> .....	7-27-36	46	45	
Canada Cement, com. <sup>48</sup> .....	7-21-36	6½	8½		Northwestern P. C., units <sup>9</sup> .....	7-14-36	53	56	
Canada Cement, pfd. <sup>48</sup> .....	7-21-36	79	80		Northwestern States P. C. <sup>47</sup> .....	7-27-36	23	24	
Canada Cement, 5½'s, 1947 <sup>48</sup> .....	7-21-36	106	106½						
Canada Crushed Stone, 6½'s, 1944 <sup>48</sup>	7-21-36	92	.....		Ohio River S. & G., com. <sup>48</sup> .....	7-25-36	1	.....	
Certainite Products, com. <sup>48</sup> .....	7-25-36	11	actual sale		Ohio River S. & G., 1st pfd. <sup>48</sup> .....	7-25-36	63	.....	
Certainite Products, pfd. <sup>48</sup> .....	7-24-36	89	actual sale		Ohio River S. & G., 2nd pfd. <sup>48</sup> .....	7-25-36	4	.....	
Certainite Products, 5½'s, A, 1948	7-27-36	92½	actual sale		Ohio River S. & G., 6's <sup>48</sup> .....	7-16-36	9	11	
Consol. Cement, 1st 6's, 1950 <sup>47</sup> .....	7-27-36	77	79		Oregon P. C., com. <sup>47</sup> .....	7-27-36	3	4	
Consol. Cement, A <sup>47</sup> .....	7-27-36	4½	5		Oregon P. C., pfd. <sup>47</sup> .....	7-27-36	92	95	
Consol. Oka. S. & G., 6½'s, 1948 <sup>48</sup>	7-21-36	12	20		Oregon P. C., conv. pfd. <sup>47</sup> .....	7-27-36	60	65	
Consol. S. & G., pfd. <sup>48</sup> .....	7-21-36	31	.....						
Consol. Rock Products, units <sup>47</sup> .....	7-27-36	60c	90c		Pacific Coast Agg., new com. <sup>48</sup> .....	7-13-36	2½	3	
Construction Mat., com. <sup>47</sup> .....	7-27-36	10c	20c		Pacific P. C., com. <sup>48</sup> .....	7-13-36	3½	5	
Construction Mat., pfd. <sup>47</sup> .....	7-27-36	½	1		Pacific P. C., pfd. <sup>48</sup> .....	7-13-36	44	48	
Consumers Rock & Gravel, 1st mtg. 6½'s, 1948 <sup>47</sup> .....	7-27-36	29	31		Peerless Cement, com. <sup>47</sup> .....	7-27-36	1	2	
Cosca P. C., 1st 6's <sup>47</sup> .....	7-27-36	31	35		Peerless Cement, pfd. <sup>47</sup> .....	7-27-36	8	10	
Coplay Cement Mfg., pfd. <sup>47</sup> .....	7-27-36	11	15		Penn.-Dixie Cement, com. <sup>48</sup> .....	7-25-36	6½	actual sale	
Coplay Cement Mfg., 6's, 1941 <sup>47</sup> .....	7-27-36	90	95		Penn.-Dixie Cement, pfd. A.....	7-24-36	37½	actual sale	
Cumberland P. C., 7's, 1937 <sup>47</sup> .....	7-27-36	90	100		Penn.-Dixie Cement, 6's, A, 1941.....	7-24-36	95½	actual sale	
					Penn. Glass Sand Corp., com. <sup>47</sup> .....	7-27-36	18	26	
					Penn. Glass Sand Corp., pfd. <sup>47</sup> .....	7-27-36	120	125	
Dewey P. C., com. <sup>47</sup> .....	7-27-36	45	50		Penn. Glass Sand Corp., 1st M 4½'s, 1960.....	7-27-36	105½	actual sale	
Dolese & Shepard.....	7-27-36	40	45		Petoskey P. C., 6's, 1941 <sup>48</sup> .....	7-16-36	85	.....	
Dufferin Pav. & Cr. Stone, pfd. <sup>48</sup> ..	7-21-36	65	.....		Petoskey P. C., 6's, 1935-38 <sup>48</sup> .....	7-16-36	88	.....	
					Petoskey P. C., com. <sup>48</sup> .....	7-16-36	3	4	
Federal P. C., 6½'s, 1941 <sup>47</sup> .....	7-27-36	45	50		Republic P. C., 6's, 1943 <sup>47</sup> .....	7-27-36	101	104	
Fia. P. C., 6½'s, 1937 <sup>48</sup> .....	7-16-36	100	101		Riverside Cement, A <sup>9</sup> .....	7-16-36	11½	12½	
Fia. P. C., units <sup>47</sup> .....	7-27-36	15	16		Riverside Cement, B <sup>9</sup> .....	7-14-36	1½	2	
					Riverside Cement, pfd. <sup>9</sup> .....	7-16-36	99	101	1.50 (qu.) Aug. 1
Giant P. C., com. <sup>47</sup> .....	7-27-36	3	4		Rockland & Rockport Lime, 1st pfd. <sup>47</sup> .....	7-27-36	4	6	
Giant P. C., pfd. <sup>47</sup> .....	7-27-36	18	19						
Gyp., Lime & Alabastine, Ltd.....	7-24-36	7½	actual sale		Santa Cruz P. C., pfd. <sup>9</sup> .....	7-14-36	42½	45	
Gyp., Lime & Alabastine, 5½'s, 1948 <sup>47</sup> .....	7-27-36	94	98		Schumacher Wallboard, com. <sup>9</sup> .....	7-14-36	4½	5	
					Schumacher Wallboard, pfd. <sup>9</sup> .....	7-14-36	17	18	
Hawkeye P. C., esp. <sup>47</sup> .....	7-27-36	30	35		Signal Mt. P. C., units <sup>47</sup> .....	7-27-36	47	49	2.00 Aug. 15
Hercules Cement, com. <sup>47</sup> .....	7-27-36	30	35		Southwestern P. C., units <sup>48</sup> .....	7-13-36	200	.....	
Hercules Cement, pfd. <sup>47</sup> .....	7-27-36	80	90		Spokane P. C., units <sup>47</sup> .....	7-27-36	10	12	
Hermitage Cement, com. <sup>47</sup> .....	7-27-36	15	20		Standard Pav. & Mat. (Can.), com. <sup>48</sup> .....	7-21-36	2	2½	
Hermitage Cement, pfd. <sup>47</sup> .....	7-27-36	96	98		Standard Pav. & Mat., pfd. <sup>48</sup> .....	7-21-36	18	20	
					Superior P. C., A <sup>48</sup> .....	7-13-36	38½	42	.27½ (ac.) Aug. 1 <sup>st</sup>
					Superior P. C., B <sup>48</sup> .....	7-13-36	11½	12½	
Ideal Cement, com. <sup>47</sup> .....	7-27-36	71	74						
International Cement, com. <sup>47</sup> .....	7-24-36	52½	actual sale		Trinity P. C., units <sup>47</sup> .....	7-27-36	23	25	
International Cement, conv. deb. 4's, 1945.....	7-24-36	149½	actual sale						
					U. S. Gypsum, com. <sup>48</sup> .....	7-25-36	99½	actual sale	
Kelley Island L. & T.....	7-27-36	22	23		U. S. Gypsum, pfd. <sup>48</sup> .....	7-24-36	101½	actual sale	
Ky. Cons. Stone, 6½'s, 1938 <sup>47</sup> .....	7-27-36	16	18						
Ky. Cons. Stone, com. <sup>47</sup> .....	7-27-36	1	2		Volunteer P. C., 1st 7's, 1942 <sup>47</sup> ...	7-27-36	90	100	
Ky. Cons. Stone, pfd. <sup>47</sup> .....	7-27-36	3	5		Volunteer P. C., units <sup>47</sup> .....	7-27-36	3	5	
Ky. Cons. Stone, 1st mtg., 6½'s <sup>48</sup> ...	7-16-36	15	17		Vulcanite P. C., com. <sup>47</sup> .....	7-27-36	5	7	
Ky. Rock Asphalt, 6½'s, 1936 <sup>47</sup> .....	7-27-36	20	25		Vulcanite P. C., 7½'s, 1943 <sup>47</sup> .....	7-27-36	96	100	
Lawrence P. C., com. <sup>48</sup> .....	7-25-36	18½	20		Wabash P. C. <sup>47</sup> .....	7-27-36	9	10	
Lawrence P. C., 5½'s, 1942 <sup>47</sup> .....	7-27-36	98	100		Warner Co., ww, 1st 6's, 1944 <sup>47</sup> ...	7-27-36	69	71	
Lehigh P. C., com. <sup>47</sup> .....	7-24-36	21½	actual sale	.25 Aug. 1	Warner Co., com. <sup>47</sup> .....	7-27-36	2	3	
Lehigh P. C., 4% pfd. <sup>47</sup> .....	7-24-36	102	103		Warner Co., pfd. <sup>47</sup> .....	7-27-36	8	10	
Louisville Cement <sup>47</sup> .....	7-27-36	99	.....		Whitehall Cement Mfg. com. <sup>47</sup> .....	7-27-36	40	43	
Lyman-Richey 1st 6's, 1935 <sup>47</sup> .....	7-27-36	20	25		Whitehall Cement Mfg., pfd. <sup>47</sup> .....	7-27-36	47	50	
					Wisconsin L. & C., 1st 6's, 1940 <sup>47</sup> ...	7-27-36	75	80	
					Wolverine P. C., com. <sup>47</sup> .....	7-27-36	5	6	
Marbelite Corp., com. (cement pts.) <sup>48</sup>	7-13-36	35c	65c						
Marbelite Corp., pfd. <sup>48</sup> .....	7-13-36	4½	4½		Yosemite P. C., A com. <sup>48</sup> .....	7-13-36	5	5½	
Marblehead Lime, 7's, 1944 <sup>44</sup> .....	7-16-36	98	100						
Marquette Cement, com. <sup>48</sup> .....	7-25-36	32½	34½						
Marquette Cement, pfd. <sup>47</sup> .....	7-27-36	98	102						
Material Service Corp. <sup>47</sup> .....	7-27-36	7	8						
McCrady-Rodgers, com. <sup>47</sup> .....	7-27-36	5	6						
McCrady-Rodgers, 7% pfd. <sup>47</sup> .....	7-27-36	25	35						
Medusa P. C., com. <sup>47</sup> .....	7-27-36	15½	15½						
Medusa P. C., pfd. <sup>47</sup> .....	7-27-36	45	50						
Michigan L. & C., com. <sup>47</sup> .....	7-27-36	40	45						
Minnesota Mining & Mfg. Co. <sup>47</sup> .....	7-23-36	31½	actual sale						
Missouri P. C. <sup>47</sup> .....	7-27-36	16½	actual sale	.12½ July 31 4% July 1					
Monarch Cement, com. <sup>47</sup> .....	7-27-36	95	100						

Quotations by: <sup>9</sup>A. E. White Co., San Francisco, Calif. <sup>44</sup>The Securities Co. of Milwaukee, Inc., Milwaukee, Wis. <sup>47</sup>Wise, Hobbs & Seaver, Inc., Boston. <sup>48</sup>Martin Judge, Jr. and Co., San Francisco, Calif. <sup>47</sup>Nesbitt, Thomson & Co., Toronto. <sup>47</sup>First National Bank of Chicago, Chicago, Ill. <sup>47</sup>Anderson Plotz and Co., Chicago, Ill. <sup>47</sup>Hewitt, Ladin & Co., New York, N. Y.

<sup>9</sup> This leaves arrears of \$3.32 a share.  
<sup>†</sup> This leaves arrears of \$2.75 a share.

## Recent Dividends Announced

Calaveras Cement, pfd. (accum.)	\$1.00	Sept. 1, 1936
Missouri P. C.	.12½	July 31, 1936
Monarch Cement Co., 4%		July 1, 1936
Monolith P.C., 8% pfd. (accum.)	.25	Aug. 12, 1936
Superior P.C., A.	.27½	Aug. 12, 1936

**Pacific Coast Aggregates, Inc.,** San Francisco, Calif.: San Francisco Stock Exchange has admitted to listing company's \$10 par common stock. Of the 600,000 shares authorized, 554,586.76 shares were outstanding as of June 16, 1936.

**Rockland-Rockport Lime Co., Inc.,** Rockland, Me., reports for the nine months to December 31, 1935, an operating profit of \$16,106; interest, insurance and taxes, \$16,188, leaving a deficit of \$82, before taking \$9,338 depreciation and depletion charges.

**American Silica Sand Co.,** Ottawa, Ill., reports for the years ended December 31 net income, after depreciation, taxes, etc.:

	1935	1934
Income	\$7,901	\$5,784
Earned per share	\$0.41	\$0.30
Number of shares, 19,500.		

Current assets as of December 31, 1935, were \$26,519 and current liabilities \$8,752.

**International Cement Corp.,** New York City, reports for quarter ended June 30, 1936, subject to year-end adjustments, show net profit of \$746,981 after depreciation, interest, reserve for federal income taxes and contingencies, etc., equivalent to \$1.10 a share on 678,791 no par shares of capital stock. No mention is made of provision for federal surtaxes on undistributed profits. This compares with \$468,304 or 71c a share on 656,740 shares in preceding quarter and \$339,418 or 54c a share on 626,278 shares in June quarter of previous year.

For six months ended June 30, last, net profit was \$1,215,286 after charges and federal income taxes, equal to \$1.79 a share on 678,791 shares, comparing with \$455,020 or 72c a share on 626,278 shares in first half of 1935.

Income account for quarter ended June 30, 1936, compares as follows:

	1936	1935
Net sales	\$4,769,883	\$3,864,781
Cost, expense and depreciation	3,704,894	3,160,778
Profit	\$1,064,989	\$704,003
Interest, etc.	93,410	220,388
Reserve for contingencies and income tax	224,598	144,197
Net profit	\$746,981	\$339,418
Six months ended June 30:		
Net sales	\$8,406,706	\$6,649,727
Cost, expense and depreciation	6,558,798	5,483,475
Profit	\$1,847,908	\$1,166,252
Interest, etc.	203,575	441,617
Reserve for contingencies and income tax	429,047	269,615
Net profit	\$1,215,286	\$455,020

**Alpha Portland Cement Co.,** Easton, Penn., preliminary report for 12 months ended June 30, 1936, subject to annual audit and year-end adjustments, shows consolidated profit of \$259,906 after taxes, depreciation, depletion, minority interest, etc. No provision has been made in this report for federal taxes or surtaxes.

This compares with consolidated net loss of \$256,247 for 12 months ended June 30, 1935.

Above statement includes operations of Alpha Sand Co., a former subsidiary of Alpha Portland Cement Co. to March 31, 1936, as the company disposed of its interests therein on April 24, 1936.

Current assets as of June 30, 1936, including \$4,887,533 cash, U. S. Treasury bonds, and other marketable securities, amounted to \$6,547,692, and current liabilities were \$628,536. This compares with cash and marketable securities of \$3,623,227, current assets of \$5,529,191, and current liabilities of \$498,707, on June 30, 1935.

Consolidated income account for 12 months ended June 30, 1936, compares as follows:

	1936	1935
Net sales	\$5,883,559	\$4,632,058
Operating expenses	4,525,859	3,612,412
Depreciation and depletion	1,202,557	1,456,465
Operating income	\$155,143	\$436,819
Other income	145,357	220,632
Total income	\$300,500	\$216,187
Charges	41,270	48,233
Profit	\$259,230	\$264,420
Minority interest (credit)	677	8,173
Profit	\$259,907	\$256,247
Preferred dividends		58,334
Common dividends	644,600	483,450
Deficit	\$384,693	\$798,031

\*Loss. †Net loss. ‡No provision has been made for federal income taxes or surtaxes on undistributed profits.

**American Aggregates Corp.,** Greenville, Ohio, reports consolidated income accounts for the years ending December 31, as follows:

	1935	1934
Gross revenue	\$954,474	\$907,057
Cost of sales	789,767	770,346
Operating expenses	136,271	136,519
Depreciation and depletion	289,149	289,161
Operating loss	260,713	288,969
Allied operating income	35,074	46,559
Loss	225,639	242,410
Other income	55,532	34,978
Loss	170,107	207,432
Interest charges, etc.	73,062	81,873
Net loss	243,169	289,305

Current assets as of December 31, 1935, were \$306,178; current liabilities, \$205,492.

**Lehigh Portland Cement Co.,** Allentown, Penn., reports for 12 months ended June 30, 1936, show net profit of \$1,170,857 after depreciation, depletion, obsolescence and normal federal income taxes. Based on the new capital set-up, the above net profit is equivalent after allowing for 12 months' dividend requirements on 121,467 shares (par \$100) 4% preferred stock, to \$1.38 a share on 495,628 shares (par \$25) of common stock. Company states that no provision has been made for federal surtaxes on undistributed prof-

its as such taxes are not determinable at this time. This compares with net profit for the 12 months ended June 30, 1935, of \$682,649, equal on present share basis, to 39c a share on the common stock.

**Yosemite Portland Cement Corp.,** Merced, Calif., reports for the year ended December 31, 1935: Earned surplus, after depreciation, depletion, etc., \$60,455, compared with a deficit of \$39,423 in 1934. Gross income from sales increased 25.7%, the volume of output being 334,265 bbl., an increase of 8.8% over 1934. The 1935 increase in the average selling price of more than 15%, it is said, largely represents elimination of the abnormal conditions of the previous year rather than an increase in basic prices. The current assets aggregated \$582,579 as of December 31, 1935, an increase of \$198,494.55 over 1934. Within this group, cash increased by \$122,221, receivables increased by \$34,411, inventories decreased by \$21,137, and there appeared a new item of \$63,000 due from trustees of bonds called for redemption. The excess of the redemption price over cost resulted in a profit of \$10,101. Current liabilities of \$48,744 were \$21,177 greater than in the previous year because of an increase in accounts payable of approximately \$11,000, an increase in estimated liability for current taxes of about \$12,000, and a small net reduction in other items. At the end of the year cash balances of \$289,620 were available to meet these liabilities.

The net accumulation of earned surplus since the company started operation is as follows:

	Three months..1927	Additions to Surplus	Surplus Dec. 31
Year .....	1928	\$9,296.49	\$9,296.49
Year .....	1929	72,122.99	62,826.50
Year .....	1930	124,806.73	187,633.23
Year .....	1931	58,769.07	246,402.30
Year .....	1932	40,979.42	287,381.72
Year .....	1933	24,910.01	262,471.71
Year .....	1934	70,169.38	192,302.33
Year .....	1935	39,422.74	152,879.59
Year .....	1935	60,455.39	213,334.98

\*Deductions from surplus.

**Schumacher Wall Board Corp.,** Los Angeles, Calif., (gypsum products) reports the best year since 1931, for its fiscal year ending April 30, 1936.

Operations of the company for the fiscal year ended April 30, 1936, resulted in net profit of \$35,708, after depreciation, taxes, and all charges. This compares with net profit of \$953 reported for the preceding fiscal year.

As of May 15, last, unpaid dividends on the 29,410 shares of no par \$2 cumulative preferred stock outstanding amounted to \$8 a share. Last dividends on the preferred stock were paid May 15, 1932.

The company does not release income or sales figures. As of April 30, last, current assets were \$150,822 of which cash was \$67,940 and current liabilities totaled \$51,689. At the close of the preceding fiscal year, current assets were reported at \$116,351, including cash of \$39,503, and current liabilities of \$69,485.

## TRAFFIC and TRANSPORTATION

### Proposed Rate Changes

THE FOLLOWING are the latest proposed changes in freight rates up to and including the week of July 25:

### New England

39533. **Waste stone**, C. L., from Danby, Vt., to Waltham, Mass., \$1.50 per net ton for local delivery, and proportional rate \$1.40 per net ton to apply when manufactured product is reshipped from Waltham, Mass., by rail. Reason—To assist in establishing a new industry.

### Trunk

34758 (Sup. 2). **Slate**, crushed, dust or ground, C. L., minimum weight 50,000 lb., to Watertown, Conn., from D. & H. R. R. stations, Fair Haven, Vt., to Castleton, Vt., and Poultney, Vt., to West Pawlet, Vt., 17c per 100 lb., and from Bangor and Pen Argyl, Penn., 14c per 100 lb.

Sup. 2 to 34852. **Sand** (other than ground or pulverized or naturally bonded molding), and **gravel**, in open top cars without tarpaulin, C. L., (See Note 2), from Kenvil and Hopatcong Junction, N. J., to Nazareth and Wind Gap, Penn., 90c per net ton.

34877 (Sup. 1). **Sand** (A, B, and C as in July issue) and **D sand**, ground or pulverized, to Montreal, P. Q.

From	A-B-C	D
Berkeley Springs, W. Va.	\$5.65	\$5.88
Great Cacapon, W. Va.	5.65	5.88
Hancock, W. Va.	5.65	5.88
Gore-Triplett, Va.	5.75	5.98

(Rates in cents per 2000 lb.)

34877 (Sup. 2). To Montreal, P. Q., from Mapleton district, including Brumbaugh and Tatesville on the H. & B. T. M. R. R., A, B, C, \$5.65, and D, \$5.88 per net ton.

34914 **Refuse fullers' earth**, C. L., (See Note 2), from Bradford, Penn., to Ashtabula, Ohio, \$1.50 per net ton in open cars, and \$1.70 in box cars.

34916. **Stone, waste or refuse**, C. L., (See Note 2), from Martinsburg, W. Va., to Millville, W. Va., 45c per net ton.

34917. **Crude gypsum rock**, C. L., (See Note 2), from Chester-Marcus Hook, Penn., to Hudson, N. Y., and Howe's Cave, N. Y., \$2.80, and Fordwick, Va., \$2.70 per net ton.

34927. **Sand** (other than ground or pulverized, or natural bonded molding), carloads, (See Note 2), from Blossvale, McConellsville and Humaston, N. Y., to Warsaw, N. Y., \$1.70 in open top cars and \$1.80 per net ton in closed cars or open cars with tarpaulin.

34943. **Crude fluxing limestone**, C. L., (See Note 2), from Myerstown, Penn., to Phoenix, N. J., \$1.65 per net ton.

34944. **Limestone**, ground or pulverized, C. L., minimum weight 60,000 lb., from Albany and Rochester, N. Y., to N. Y. C. R. R. stations, Sennett, Martisco, Schenectady, Albany, etc., rates ranging from 65c to \$1.95 per net ton.

34951. **Sand** (other than ground or pulverized or naturally bonded molding); and **gravel**, in open cars, without tarpaulin, carloads, (See Note 2), from Severn, Md., to Waterloo, Va., \$1 per net ton.

34956. **Slag, roofing granules**, C. L., minimum weight 50,000 lb., from Sheridan, Penn., various rates to points in C. F. A. territory, same as from Marietta, Penn., on page 81, Curlett's Tariff I. C. C. A-484.

34957. **Sand** (other than ground or pulverized or naturally bonded molding), and **gravel**, in open top cars without tarpaulin, C. L., (See Note 2), from Hopatcong Junction, N. J., to Honesdale, Penn., \$1.80 per net ton.

34960. **Crushed stone**, C. L., (See Note 2), from Blakeslee, N. Y., to points in New York state on the N. Y. C. R. R., rates ranging from \$1 to \$1.50 per net ton.

\*Note—The oil, tar and/or asphaltum not to exceed 10% by weight of the commodity shipped, the shipper to so specify on shipping orders and bills of lading.

34965. **Crushed stone and screenings**, in straight or mixed carloads (not agricultural or ground limestone, unburnt; fluxing stone or firestone or coated stone). (See Note 2), from Monocacy, Penn., to Cincinnati, O., 24½c per 100 lb.

34970. **Spent fullers' earth**, C. L., from plant of the Vacuum Oil Co. at Paulsboro, N. J., to plant of I. P. Thomas & Sons Co., Paulsboro, N. J., \$13.50 per car, applicable only on non-road haul traffic.

34973. **Rock, ganister**, not ground, in open top cars, C. L., (See Note 2), from Cumberland, Md., to Baltimore, Md., \$1.40 per net ton.

34974. **Sand** (other than ground or pulverized or naturally bonded molding), and **gravel**, in open top cars without tarpaulin, C. L., (See Note 2), from Bowmanstown, Penn., to Avoca, Dunmore and Pittston, Penn., \$1.20 per net ton.

34980. **Stone**, crushed, coated, C. L.,\* (See Note 2), from White Haven, Penn., to Forest City, Penn., \$1.33 per net ton.

34984. **Gravel, sand, slag and stone**, crushed, coated, C. L.,\* (See Note 2), from Martinsburg, W. Va., Greer, W. Va., and Casparis, Penn., to points in Maryland and West Virginia, rates ranging from \$1.37 to \$1.95 per net ton.

34986. **Rubble stone**, C. L., min. wt. 50,000 lb., from Grove, Md., to Berwyn, Md., \$1.13 per net ton.

34987. **Limestone**, crude, fluxing, foundry or furnace, in open top cars, C. L., (See Note 2), from Capon Road, Stephens City, Va., and Millville, W. Va., to Tyrone, Penn., \$1.95 per net ton.

34988. **Limestone**, ground or pulverized, C. L., minimum weight 60,000 lb., from Niagara Falls, N. Y., to various points in New York, New Jersey and Pennsylvania, rates ranging from 60c to \$3.45 per net ton.

34988. **Stone**, crushed, coated,\* C. L.; **gravel**, coated, in bulk in open top equipment, C. L. (Note 2), from Wyoanna, Penn., to points in New York and Pennsylvania on various roads, rates ranging from 93c to \$1.83 per net ton.

35004. **Slag, furnace** (ground or pulverized), in bags, C. L., minimum weight 50,000 lb., from Niagara Falls, N. Y., to points in New York and Pennsylvania, rates ranging from 60c to \$3.20 per net ton.

35005. **Firestone**, rough quarried, C. L., minimum weight 50,000 lb., from Glenside, Laverock and Somerton, Penn., to Black Rock, Buffalo and East Buffalo, N. Y., \$2.60 per net ton.

35008. **Limestone**, ground or pulverized, carloads, minimum weight 60,000 lb., from Lime Crest, N. J., to points in New York, New Jersey and Pennsylvania, rates ranging from 60c to \$2.60 per net ton.

35009. **Crushed stone**, C. L. (Note 2), from Lime Crest, N. J., to points in New York, New Jersey and Pennsylvania, rates ranging from 60c to \$1.25 per net ton.

35021. **Slate**, crushed, dust or ground, C. L., minimum weight 50,000 lb., from Muncy, Penn., to Boston stations, Mass., 21c per 100 lb.

35023. **Sand**, naturally bonded molding, in open top equipment or in box cars, C. L. (Note 2), from Catasaqua, Penn., to Bethlehem, Penn., 80c; Pen Argyl, Penn., 90c; Weatherly, Penn., \$1, and Latimer Mines, Penn., \$1.10 per net ton.

35027. **Crushed stone**, coated, C. L. (Note 2), from Winfield, Penn., to Montrose, Penn., \$1.63 per net ton.

### Central

47309. To establish on **crushed stone**, C. L., in open top cars, from Greencastle, Ind., to Blissfield, Mich., 129c; Findlay, Fre-

Note 1—Minimum weight marked capacity of car.

Note 2—Minimum weight 90% of marked capacity of car.

Note 3—Minimum weight 90% of marked capacity of car, except that when car is loaded to visible capacity the actual weight will apply.

mont, Ohio, 130c; Holland, Mich., 124c; Ottawa and Paulding, Ohio, 130c per net ton plus emergency charges.

47314. To establish on **sand**, industrial, or **gravel**, in open top cars; C. L., from Mantua, Ohio, to Alexandria, Ohio, 80c per net ton.

47315. To establish on **furnace or foundry limestone**, C. L., in open top cars, from Cleveland, Ohio, (ex-lake), to Midland, Penn., 105c per gross ton, subject to emergency tariff. (Will not include handling charges at Cleveland, Ohio.)

47335. To establish on: (A) **Sand**, naturally bonded moulding in all kinds of equipment, C. L.; other sand in closed equipment, C. L.; and (B) **sand** (except naturally bonded moulding ground or pulverized sand), in open top equipment, C. L., (See Note 3), but no orders for closed and open top cars of less than 60,000 and 80,000 lb. respectively. From Portland, N. Y. Rates in cents per net ton: To Cleveland, Ohio; (A) 160, (B) 125. To Buffalo, N. Y.; (A) 110, (B) 85.

47363. To cancel rates on **sand and gravel** from Kent Sand and Gravel Pit, Ohio, to points in C. F. A. territory and points east of the Western terminus of Eastern Trunk Lines, also points in W. T. L. territory; class rates to apply.

47411. To establish on **dolomite**, roasted, C. L., min. wt. 60,000 lb., (A) from northwestern Ohio producing points, Bettsville, Nario, Maple Grove, Ohio; (B) Durbin, Ohio. Rates in cents per net ton:

To	(A)	(B)
Ansonia, Conn.	370	370
Boston, Mass.	380	380
Bridgeport, Conn.	350	350
Everett, Mass.	380	380
Hartford, Conn.	370	370
Indian Orchard, Mass.	380	380
Phillipsdale, R. I.	370	370
Turners Falls, Mass.	380	380
Watertown, Mass.	380	380
Worcester, Mass.	380	380

47424. To establish on **sand** (except industrial) and **gravel**, C. L., in open top cars, (See Note 3), from Warsaw, Ind., to Otis, Ind., 85c per net ton.

47478. To establish on **crushed stone** and **crushed stone screenings**, in bulk, in straight or mixed carloads, in open top cars, from McVittys, Ohio, to Marietta, Ohio, 145c per net ton.

47477. To establish on **industrial sand**, C. L., min. wt. per I. C. C. LS-1855, from Bremen, Ohio, to Zanesville, Ohio, 70c in open top cars and 81c per net ton in box cars.

47479. To establish on **limestone**, unburnt, agricultural, ground or pulverized, in box cars, C. L., from Genoa, Luckey, Martin and Marblehead, Ohio, to Kellogg, Ill., 285c per net ton.

47492. To establish on **granulated slag** in open top equipment, C. L., from Cleveland, Ohio, to Binnewater and Rosendale, N. Y., 270c and from Youngstown, Ohio, 280c per net ton.

47495. To establish on (A) **sand**, naturally bonded moulding, in all kinds of equipment, carloads; other sand in closed equipment; (B) **sand**, ground or pulverized, in all kinds of equipment, carloads; (C) **sand** (except naturally bonded moulding; ground or pulverized sand, in open top equipment, carloads; (See Note 3), not less than 60,000 lb. and 80,000 lb. respectively for closed and open top cars. Also **sand** (except as shown above), and **gravel**, C. L., from Beaver, Ohio, to points in Central Freight Association territory, same as in effect from Jackson, Ohio.

47544. To establish on **slag**, commercial crushed, in bulk in open top cars, carloads, from Pittsburgh, Penn., to Castle Shannon, Penn., 80c subject to emergency charges, B. T. Jones' I. C. C. 2827.

47551. To establish on **industrial sand**, carloads from Somerdale, Ohio, to Salem, Ohio, 85c.

47554. To establish on **sand** (except industrial) and **gravel**, in open top cars, carload, from Fairport Harbor and Painesville, Ohio, to Worthington, Penn., 120c.

47556. To establish on **crushed stone**, carloads, from Bluffton, Ind., to Tipton, Ind., 75c.

47559. To establish on **limestone**, ground or pulverized, unburnt, C. L., minimum weight 60,000 lb., from Greencastle, Ind., to Illinois points: Altamont, 150c; Carmi, 145c; Danville, 130c; Effingham, 150c; Hoopeston, 140c; Lawrenceville, 160c; Mt. Vernon, 175c; Paris, 115c; Shelbyville, 150c; Vandalia, 160c.

47560. To establish on **industrial sand**, carload, in open top cars, min. wt., (See Note 3), but not less marked capacity than 60,000 and 80,000 lb., respectively, in closed

and open top cars, from M. V. Junction, O., to Cleveland, O., 70c.

47561. To establish on sand (except industrial), and gravel in open top cars, C. L., from Wolcottville, Ind., to Wallen, Ind., 55c.

47562. To establish on stone, crushed, carloads, from Keopert, Ind., to Kewanna, Ind., 85c; North Judson, Ind., 95c; La Crosse, Ind., \$1; Beatrice, Ind., \$1.10; Hammond, Ind., \$1.10.

47568. To establish on sand (except industrial), and gravel, in open top cars, carloads, from Heath, O., to points in Ohio. (Rates in cents per ton of 2000 lb.)

Bucyrus	90	Mt. Gilead	80
Centerburg	50	Mt. Perry	60
Clay Bank	80	New Lexington	60
Corning	85	Rushville	50
Fulton	60	Thornville	50
Harley	50	Thurston	40
Johnstown	40	White Cottage	80
Martel	85	Zanesville	85

47569. To establish on industrial sand, in open top cars, per item 30 of Tariff N. Y. C. I. C. L. S. 1855. (Rates in cents per ton of 2000 lb.), from Amherst, Ceylon, Huron and Sandusky to Lima, O., 90; Marion, O., 90; Marysville, O., 90; Napoleon, O., 110; New Comerstown, O., 140; Piqua, O., 110; Sidney, C., 110, and Tiffin, O., 80.

Note—In closed equipment rates to be 115% of open top car rates.

47571. To establish on sand (except industrial), and gravel in open top cars, C. L., from Indianapolis, Ind., to Advance, via P. R. R., Lebanon, Ind., C. I. R. R. and via C. C. C. & St. L. Ry., Lebanon, Ind., C. I. R. R., and to Thorntown, Ind., via C. C. C. & St. L. Ry. direct; from Lafayette, Ind., to Advance, via C. C. C. & St. L. Ry., Lebanon, Ind., C. I. R. R. and to Thorntown, Ind., via C. C. C. & St. L. Ry. direct, rate of 65c per net ton.

47587. To establish on stone, natural, other than bituminous asphalt rock; other than granite, jasper, marble or onyx; rough quarry, C. L., from Crow Summit, W. Va., to Constitution, O., 113c per net ton, subject to emergency charge.

47608. To establish on dolomite, roasted, from Kellogg, Ill., to Ft. Wayne, Ind., 240c per ton (proportional rate, which is 13% of first class rate of 96c).

47611. To establish on crushed stone and/or strippings, in open top cars (Note 3), from Thornton, Ill. (via C. & E. I. Ry., Hopkins Park, Ill. (State Line Junction, Ill.-Ind.), and C. A. & S. R. R.), to Pine Village, Chatterton, Winthrop, Kickapoo, Glen Cliff and Attica, Ind., 90c per net ton.

47614. To establish on (a) sand, naturally bonded moulding, in all kinds of equipment, C. L.; other sand, in closed equipment, C. L.; (b) sand, ground or pulverized, in all kinds of equipment, C. L.; (c) sand (except naturally bonded moulding; ground or pulverized sand) in open top equipment, C. L.; from Ottawa, Ill., district to South Unadilla, N. Y., (a) 400c; (b) 440c, and (c) 400c per net ton.

47615. To establish on (a) sand, naturally bonded, moulding, in all kinds of equipment, C. L.; (b) sand, ground or pulverized, in all kinds of equipment, C. L., and (c) sand (except naturally bonded, moulding; ground or pulverized sand), in open top equipment, C. L.; from Ottawa district (Illinois) to Blawnox, Penn., (a) 310c; (b) 341c, and (c) 310c per net ton.

47628. To establish on crushed slag or crushed commercial slag (other than granulated), in open top cars, C. L., from Hamilton, Ohio, to Greenville, Ohio, 90c per net ton.

47629. To establish on crushed stone, C. L., from Fairmount, Ill., to Indiana destinations, single line Kickapoo scale basis: To State Line, Johnsonville, Mashfield, W. Lebanon, 65c; Williamsport, Attica, 70c; Riverside, Flint, W. Point, 75c; Shadeland and Lafayette, 80c per net ton.

47632. To establish on limestone, agricultural or pulverized, unburnt, in bags or in bulk, in box cars, min. wt. 80,000 lb., from Sibley, Mich., to Tula, 375c; Iron River, 360c, and Wakefield, Mich., 365c per net ton.

47636. To establish on slag, crushed or crushed commercial, in open top cars, C. L., min. wt. 80% of marked capacity of car, from Lorain, Ohio, to Solon, Ohio, 80c per net ton.

47637. To establish on sand, burnt, refuse moulding or foundry, C. L. (Note 3), from Muncie, Ind., to Decatur, Ind., 113c per net ton.

47639. To establish on core sand, C. L., from the Vassar, Mich., group to Batavia, N. Y., 215c in open cars and 220c per net ton in closed cars.

47641. To establish on broken stone, chips, rip rap and spalls, C. L. (Note 3), from Port Austin, Mich., to Peoria, Ill., 380c per net ton.

47647. To establish on sand, refuse grinding, C. L., from Toledo, Ohio, to Detroit, Mich., 105c, and to Jackson, Mich., 120c per net ton.

47648. To cancel rates on stone, crushed, slag and gravel, coated, in open top cars, C. L., from Grand Rapids, Mich., Ft. Wayne, Ind., Peoria, Ill., Maple Grove, Ohio, and Toledo, Ohio, to points in Michigan, Indiana, Illinois and Ohio, published in P. R. R. Tariff 317-D; classification basis to apply.

47660. To establish on (A) sand, naturally bonded moulding, in all kinds of equipment, C. L.; sand (except naturally bonded moulding; ground or pulverized sand), in closed equipment, C. L. (B) Sand, ground or pulverized, in all kinds of equipment, C. L. (C) Sand (except naturally bonded moulding; ground or pulverized sand), in open top equipment, C. L. (Note 3), but not for closed and open top cars of less marked capacity than 60,000 and 80,000 lb., respectively, from Evansville, Ind., district to West Kankakee, Ill. (A) 210c; (B) 231c, and (C) 200c per net ton, subject to emergency tariff 542-A.

47662. To establish on quartzite, C. L., from Niagara Falls, N. Y., to Alloy, W. Va., 300c per net ton.

47664. To establish on crushed stone and crushed stone screenings and agricultural limestone, unburnt, in bulk, in open top cars C. L., from Berna, Ind., to Auburn, Ind., 80c per net ton.

47682. To cancel rate on sand, burnt, or refuse foundry, in open top cars, from Toledo, Ohio, to Cincinnati and St. Bernard, Ohio; classification basis to apply.

47683. To cancel rate on slag, waste, tailings and pit run, crude, carload, from Toledo, Ohio, to Cement City, Mich.; classification basis to apply.

47689. To establish on rubble stone, minimum weight 50,000 lb., between points in C. F. A. territory; between points in Northern Illinois, Northern Iowa, Extended Zone C territory in Wisconsin, points in W. T. L. "Northwest" territory, and points in C. F. A. territory east of the Indiana-Illinois State Line, including Chicago switching district in Indiana, also points on and east of the east bank of Lake Michigan; from other points in W. T. L. territory, to various points in C.F.A. territory, and from various points to Trunk line territory. Class 20 rating.

47681. To cancel rate on rough building stone, minimum weight 40,000 lb. per car, from Sandusky, Ohio, to London, Ont.; classification basis to apply.

## Southern

12054. To establish 248c per ton, phosphate rock and limestone, phosphatic, C. L., Item 5, L. & N. R. R. G. F. O. 30-C, and Item 25, N. C. & St. L. Ry. Tariff 17, Mt. Pleasant-Centreville District to Tupelo, Miss.

12119. Establish from Ketona, Ala., 158c net ton to Mobile, Ala., and 177c net ton to New Orleans, La., on limestone, ground or pulverized, C. L., minimum 67,000 lb., except when marked capacity of car is less, (See Note 1).

12153. Establish from Harrodsburg, Ky., to points in Ala., Ga. and Tenn., rates on fluor spar, C. L., per item 558, S. F. T. B. I. C. C. 1314, same as from Marion, Ky.

12154. Establish, per net ton, on ground or pulverized limestone, C. L., minimum 60,000 lb., from Harrodsburg, Ky.: To Chicago, Ill., 340c; Toledo, O., 300c; Cleveland, O., 340c; Pittsburgh, Penn., 360c; Philadelphia, Penn., 480c; Rochester, N. Y., 420c; New York, N. Y., 520c; Charleston, W. Va., 580c; Ft. Marion, Penn., 360c; Akron, O., 340c.

12168. Establish I. C. C. Docket 17517 scale, plus arbitrary of 10c per net ton, sand, gravel, crushed stone (except bituminous rock or bituminous asphalt rock), slag, limestone, crushed, in open top cars, limestone, ground or pulverized, loaded in open top equipment; marble, crushed (not ground or pulverized), in bulk in open top cars per S. F. T. B. 388-A, between points in S. F. A. territory and A. & N. C. R. R. stations.

12238. Establish same rates on fullers' earth, C. L., from Ochlocknee, Ga., as are published from Attapulgus, Ga., to Dayton, Ohio, Neville Island, Penn., and East St. Louis, Ill. A. C. L. R. R. Tariff I. C. C. B-2858.

12239. Establish 502c net ton, slate, broken or crushed, C. L. (Note 2), Fairmount, Ga., to York, Penn.

12266. Establish 40c net ton, stone (including dolomite stone), crushed or broken, C. L. (Note 3), Pelham, Ala., to Bessemer, Ala. (intrastate).

## Western

D-41-167. Limestone, crushed or ground, (See Note 3), not less than 40,000 lb., from Omaha, Neb., to Chicago, Ill., and points taking Chicago rates. Proposed, 13½c per 100 lb.

D-41-172. Granules, roofing, C. L. (See Note 1), from Pine Hill and Marquette, Mich., to Lowell, Ind. Proposed—\$2.40 per net ton, subject to emergency charges.

E-155-2. Fluorspar, C. L., minimum weight 60,000 lb., from Northgate, Colo., to Wilmington, Del. Proposed—\$11.40 per ton of 2000 lb.

C-41-173. Silica sand; in open top cars (Note 3). In no case less than 60,000 lb., from Ottawa-Utica, Ill., to Waterloo, Iowa. Proposed—\$1.65 per ton of 2000 lb.

## Southwestern

8552. To establish on silica sand, carloads, (See Note 3), but not less than 54,000 lb., from Everton, Ark., to Little Rock, Ark., \$1.53; to Texarkana, Ark.-Tex., \$2.19, and to Memphis, Tenn., \$1.70 per net ton.

8565 and 8616. Chatt, sand, gravel and crushed stone. To establish 20% reduction from Oklahoma origins to White Eagle and Marland, Okla., with a similar reduction from Arkansas City, Kan.

8589. Feldspar. To add Texas Creek, Colo., as point of origin where Canon City-Echo-Spikebuck, Colo., is shown in S. W. L. Tariff 14-Q, also in Rate Notice 14675.

8677. Gravel, Black Rock, Ark., to Memphis, Tenn. To establish a rate of 79c per ton of 2000 lb. carloads.

8725. Flint sand. To establish rate of 250c per ton of 2000 lb. (Note 2) from Webb City, Mo., to Decatur, Ill.

8726. Chatt, sand, gravel and crushed stone, carloads, to Bartlesville, Okla.: From Tulsa, Okla., also all other Oklahoma shipping points, rates based 14c per ton less than standard scale, as in Item 800, S. W. L. Tariff 162-K. From Moline, Kan., on crushed stone, rate of 76c per net ton, or 14c less than normal rate.

8816. To establish from Moyers, Okla., to Birmingham and Mobile, Ala., rates of 308c and 298c per ton of 2000 lb., respectively, on broken stone, ranging in size up to 200 lb., carloads.

## Texas-Louisiana

8691-8-TX. Sand and gravel, to establish rate of 90c per ton (Note 3), from Ady, Tascosa, Magenta, Berger, Murdo, Quitaque, Edgin to Samnorwood and Shamrock, Texas. To expire June 30, 1937. There is a paving job, which is expected to be concrete of approximately 16 miles, starting at Shamrock and running east to a point approximately seven miles west of Wellington. Rail shippers are not able to pay the standard rates and compete with the roadside pit.

9737-1-TX. To establish rate of 61c per ton of 2000 lb. on sand and gravel, straight or mixed carloads (Note 1), except when actual weight of car loaded to full space capacity is less such actual weight will be used, from Ord to McKinney. To expire December 31, 1936.

## Illinois

6662-1. Limestone, crushed, ground or pulverized, not burnt; minimum weight 50,000 lb., between I. R. C. points. Proposed—60% of sixth class.

7497-4. Agricultural limestone, also limestone dust and limestone, ground, C. L., in cents per 100 lb.: from Falling Springs, Ill., to Salem, Ill., and Odin, Ill., 70; Krause, Ill., and Stolle, Ill., to Salem, Ill., and Odin, Ill., 80.

## Transcontinental

18516. Roasted dolomite, C. L., W. B.: proportional rate, \$10 per net ton, min. wt. 80,000 lb., from Chicago, Ill., to Los Angeles, Richmond, Oakland, San Francisco, Calif., Seattle, Wash., and Portland Ore., on traffic originating east of the Indiana-Illinois state line.

### Gravel Rate Established

A rate of 65c per ton on gravel shipped from Cram in Calhoun county, Arkansas, to the state highway department at Rison was authorized by the Arkansas Corporation Commission July 13, and the Rock Island Lines were authorized to make the new rate effective on notice of one day.

### Lower Rates to New Mexico Possible

The Interstate Commerce Commission has authorized railroads to establish rates on cement from Iola, Independence, Fredonia and Fort Scott, Kan., to points in New Mexico without observing the long and short haul clause.

### I. C. C. Reports

26968. E. I. Du Pont de Nemours & Co., Inc., vs. B. & O. et al. By division 4. Rates, **ground or pulverized limestone**, Engle, W. Va., and York and Annville, Penn., to Carney's Point, N. J., and from York to Gibbstown, N. J., and Hillside Junction, Penn., unreasonable to the extent they exceeded \$1.75, \$1.80 and \$2.10 a net ton from Annville, York and Engle, respectively, to Carney's Point, and \$1.85 and \$2.05 from York to Gibbstown and Hillside Junction, respectively, minimum 60,000 lb., plus emergency charges, where authorized. Reparation awarded.

4139. Soapstone and talc. By division 4. Report by Commissioner Porter. Pro-

posed schedules, for basing of rates, from and to southern points and to and from points in official territory, found not justified. The finding is without prejudice to filing of rates from Henry, Va., to destinations in official territory 2c per 100 lb. higher than rates which would apply from Roanoke, Va., to the same destinations based on the percentages generally applicable within official territory.

23236. Alabama Rock Asphalt, Inc., vs. Akron & Barberton Belt et al. and 25059, Alabama Asphaltic Limestone Co. vs. Same. By the Commission. On further hearing reparation totaling \$7,550.64 awarded under findings in prior report 174 I. C. C. 343, 194 I. C. C. 273, as modified in 203 I. C. C. 8, that rates, **natural asphaltic limestone** and asphaltic limestone to which asphalt has been artificially added, Margerum and Cherokee, Ala., to destinations in official territory were unreasonable. Waiver of the collection of outstanding undercharges on a shipment to Haverstraw, N. Y., authorized.

27046. Holly Sugar Corp. vs. A. T. & S. F. et al. By division 3. Dismissed. Rates, **broken limerock**, Sloan, Nev., to Dyer, Calif., not unreasonable. The complaint was filed July 8, 1935.

### Proposed I. C. C. Reports

27312. Colonna & Co., Inc., vs. Pennsylvania et al. By Examiner Harold M. Brown. Reparation of \$133.20 proposed on finding charges, **crushed stone**, Philipsburg, N. J., to Miami, Fla., unreasonable because defendants failed to follow

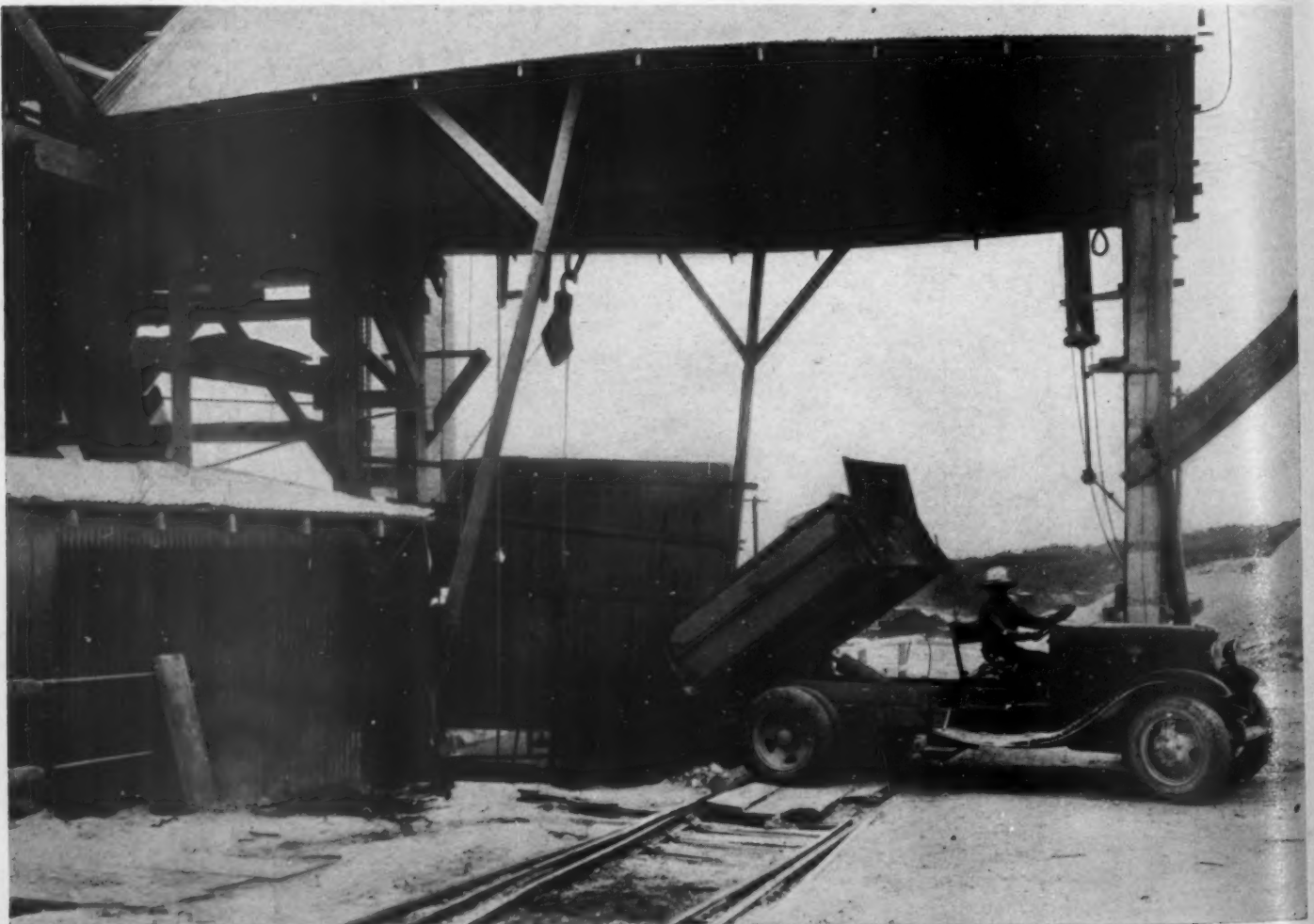
shipper's instructions that it should not be assessed with any higher minimum than 54,000 lb. A 60,000 lb. car was ordered and 100,000 lb. car was furnished for carrier's convenience, according to the report. Charges were assessed as 90,000 lb. at 36c.

27341. C. A. Wagner Construction Co. vs. C. M. St. P. & P. et al. By Examiner Leland F. James. Rate, 6c, sand, Haverstraw, Ia., to Brandon, S. D., proposed to be found unreasonable to extent it exceeded 70c a net ton, which was the rate charged. Waiver of collection of undercharges recommended.

### Aggregate Statistics

**Sand and Gravel** production in 1935 was 14% ahead of 1934, according to preliminary figures of the U. S. Bureau of Mines. Average values showed a slight decline—from 64c per ton in 1934 to 63c in 1935. Total output of commercial sand and gravel, including industrial sands, in 1935, was 125,690,000 tons, valued at \$66,000,000.

**Crushed Stone** production in 1935 was 15% below that of 1934, and the value was 18% below. Total output of commercial stone in 1935 was 77,521,000 tons valued at \$69,483,000 against 91,283,233 tons valued at \$85,031,523 in 1934. These figures include rip-rap, refractories, slate granules, etc., as well as aggregates.



Trucks in use at Sertex Materials Co. quarry, New Braunfels, Texas

## Crushed Stone Industry Looks to the Future

### National Association Directors Consider Development Plans

THE semi-annual summer meeting of the board of directors of the National Crushed Stone Association July 24, was switched at the last moment from French Lick Springs, Ind., to Hot Springs, Va., to avoid the Central West heat wave. The attendance suffered somewhat as a result, especially in representation from the West. Eighteen of the board attended.

#### Demise of Mineral Aggregates Institute

Largely to correct an impression that the Mineral Aggregates Institute died from mutual lack of support by both the National Crushed Stone Association and the National Sand and Gravel Association—which was the view expressed by ROCK PRODUCTS at the time—Otho M. Graves, the Institute's chairman, described at length the cause of its demise.

The substance of this was that while the crushed stone industry members of board of governors of the Institute had ample authority to proceed, the sand and gravel industry members did not; that the latter could make no move without taking it up with the directors of the National Sand and Gravel Association. This so handicapped the Institute that its reason for existence ceased—it wasn't needed for such coöperation between the associations as would exist any way.

#### Membership Drive

J. R. Boyd, administrative director, in his report described the efforts made to obtain new members, which include publication of a booklet detailing the aims, activities and accomplishments of the association. It is also proposed to develop much closer contacts with local associations, and this means more traveling for the administrative and engineering directors.

It is proposed to increase the membership of the Manufacturers' Division, of which C. S. Huntington, Link-Belt Co., Chicago, Ill., is now chairman, having been elected by letter ballot following the death of Gordon Buchanan.

#### Legislative Activities

This part of Mr. Boyd's report covered much the same ground as that of the executive secretary of the National Sand and Gravel Association, which is abstracted elsewhere in this issue. In addition it touched on the program of the AAA for soil improvement, promising members of the association who produce agricultural limestone full and complete data at a later date.

Various changes in the fiscal policies of the association were discussed and left to a committee to iron out; these may include fixing a maximum amount of dues for any

### New Members

THE FOLLOWING new members were elected to the National Crushed Stone Association, at the semi-annual directors' meeting, Hot Spring, Va., July 24:

New Castle Lime and Stone Co.,  
New Castle, Penn.

Dominion Mines and Quarries Co.,  
Toronto, Canada.

Tarbox-McCall Stone Co., Findlay,  
Ohio.

one company, exemption of "captive tonnage" from payment of all dues, changing the fiscal year, or the collection of dues, so as to cover the 12 months ending October 31, instead of December 31.

#### Engineering and Research

A. T. Goldbeck, engineering director, submitted a progress report on his activities in which he listed among numerous others the following:

"(a) Contacting two of the state highway departments, Virginia and Pennsylvania, regarding the acceptance of stone sand.

"(b) Designing a full-sized test column and floor panel for field tests of stone sand concrete in Pennsylvania.

"(c) Coöperating with the secretary of the Pennsylvania Stone Producers' Association in supplying him with information for use in the promotion of the acceptance of stone sand.

"(d) Performing research in our laboratory for producers or groups having to do with:

"(1) An investigation of cold bituminous mixtures as they are affected by the type of stone used and devising ways of making for more durable stone mixes.

"(2) Investigations of stone vs. gravel for surface treatment work.

"(3) Investigation of stone vs. crushed gravel for binder course under sheet asphalt.

"(4) Supplying information to the U. S. War Department engineers on concrete for dam construction.

"(5) Supplying information to PWA engineers and to the chief engineer of the airport section of the Department of Commerce."

#### Laboratory Research

Included in the laboratory work of the first six months of 1936 were (a) expansion and contraction tests on concrete; (b) Los Angeles rattler tests; (c) surface treatment investigations; (d) studies of the durability of stone sand mortar; (e) mixed-in-place

surfaces; (g) special Los Angeles rattler tests.

Among the interesting and helpful things done specifically for members Mr. Goldbeck listed these:

"(h) A special investigation was made for one of our producers to determine how best to use his screenings in the form of an asphaltic mix. Several different mixes were made and tested in our circular track and as a result we were able to recommend a mixture which would be durable and stable and well-suited to the gradation of his material.

"(i) A series of tests was conducted to determine the relative value of a tough, dense rock as against crushed gravel for use in the binder course under sheet asphalt pavements. We attempted to perform this investigation in our circular track, the results, however, were not conclusive in view of the fact that no particularly deleterious effects were noted in either of the aggregates so that it was impossible to show any superiority of one over the other with our apparatus.

"(k) An interesting investigation performed recently had to do with an effort to overcome one of the major difficulties of stone ballast, namely, the choking of the voids with cinders in the course of time. A start has been made in this direction by the use of choke stone on the surface of the ballast. Apparently, there is a good indication that the ballast can be kept cleaner if the surface voids are choked in such a way that the cinders will not be washed down into the interior of the ballast.

The laboratory, Mr. Goldbeck reported, had done testing for several states, the District of Columbia and 17 individual stone companies.

#### Work for the Future

"For the immediate future," Mr. Goldbeck said, "it is felt that one of the urgent needs is to continue to put out information in the form of publications. Although it would be desirable to push our investigational activities at a faster rate because of the large number of problems which are urgently in need of solution, it will be impossible to accomplish such an objective without a rather substantial increase in personnel and this, of course, cannot be done without proper financing. Our laboratory force is pushed to the limit at all times and they cannot accomplish work at a greater rate than has been accomplished during the past several years. Specifically, I feel that our research work should continue on bituminous types of pavements including cold mixes and surface treatments. We should also work in an effort to further introduce stone sand as a fine aggregate in concrete. Subgrade stabilization is coming to the foreground very rapidly and stone producers should find their place in this program. There is no better material than stone screenings for this purpose and this fact can be demonstrated by the use of our circular track as well as by service tests. I feel

that our active research program has paid for itself and I would welcome any suggestions on the part of producers looking toward our working on problems of even greater usefulness to the industry."

**Convention Date Left  
To Committee**

The time and place of the next annual

convention was left to the executive committee to determine, but the choice of the directors appeared to be between the Wm. Penn hotel, Pittsburgh, Penn., and the Netherlands-Plaza hotel, Cincinnati, Ohio. The date, in all probability, will be about the same as always—the third week in January, which in 1937 begins the 17th.

## Sand and Gravel Industry Problems Discussed

### Directors of National Association Pick Memphis for Convention

**M**EETING at St. Paul, Minn., July 9 and 10, in the midst of a record-breaking heat wave, the board directors of the National Sand and Gravel Association took off their coats and discussed at length problems of the industry and of the association.

The decision of the most immediate interest to the industry was the changing of the annual convention date from January to December 8, 9 and 10. The Peabody hotel, Memphis, Tenn., was selected, the association members having many pleasant memories of a previous convention there, and also it was selected as near the center of activity in the industry at this time.

The matter of association support by the industry came in for a large amount of discussion and a committee will be appointed to bring the constitution and bylaws up to date and to make recommendations regarding a different schedule of dues. The next meeting of the board will be at Memphis, December 7, when these matters will be made ready to present to the convention.

#### Industry Problems

V. P. Ahearn, executive secretary, reviewed the national situation in detail. He mentioned the 14% increase in 1935 over 1934, and said this increase was apparently accounted for by private construction, as demand for highway materials remained about the same. It is in a revival of private construction and local public works, rather than federal public works, that the industry must look to its future, he said.

#### Highway Construction

A federal-aid highway program extending through the fiscal year 1939 is assured, and highway construction is one form of federal public works which seems to have the whole-hearted support of Congress. Such sentiment is having a wholesome effect toward preventing diversion of gas-tax funds for other things than highway construction; but this diversion is still a major problem of all interested in highway construction.

#### Freight Rates

Mr. Ahearn reviewed the fight made by the industry against continuance of the emergency increase in freight rates, which

resulted in one concession as follows: that the increase in rates between \$1.00 and \$1.10 should be 4c instead of a straight 7%, thus more nearly equalizing the competitive relationship of companies whose rate being less than \$1.00 suffered no increase and those whose rates were slightly over \$1.00.

#### Silicosis

The silicosis problem of the industry was reviewed by Mr. Ahearn. He said it was largely a matter that would probably be regulated by the various states under workmen's compensation laws, and he urged the subject be given intensive study by the board of directors, that it might be helpful in framing satisfactory laws, as has been done in Illinois, with the active cooperation of interested industries.

#### Labor

The activity of labor organizers in the industry was discussed by various ones around the table. The situation at St. Louis, where the Lewis type of vertical union organization has made much headway, was discussed at length. Sentiment seemed to be that the vertical type union was preferable because this scheme of organization should avoid jurisdictional disputes between various horizontal unions, which have been the bane of the construction industry these many years.

#### Federal Legislation

The Walsh-Healey act covering wages and hours of work on government contracts of over \$10,000, was outlined by Mr. Ahearn, but it was impossible for him or anyone else at this time to tell how it will be interpreted.

The new appropriation of \$1,425,000,000 for emergency relief was itemized, the largest block of which is scheduled to be spent for highways—nearly one-third.

Changes in the Federal revenue act were detailed. Mr. Ahearn concluded: "It is a significant circumstance that at no time during the debates in Congress on this far-reaching measure, was any serious effort made to answer the charges of opponents of the bill that it was not justified either in principle or in logic. While its avowed purpose was to improve federal income, the

bill established a governmental policy of exerting public control over the use of corporation funds. A system of taxation which had prevailed for many years and which was likely to produce \$1,000,000,000 of revenue next year, was scrapped in favor of an untried theory whose yield was unpredictable and whose administration will be costly and difficult. While the public might reasonably have expected a strong justification of the tax measure by those who sponsored it on the floors of Congress, it was disquieting to observe that the House manager of the bill contented himself with the convenient generality that its only opponents were ignorant or selfish people. A full understanding of the effect of the new tax bill will not be possible until the rules and regulations of the Commissioner of Internal Revenue are released later in the year. We shall make copy of such rules and regulations available to member companies for their guidance."

The Patman-Robinson price control act is another piece of legislation, of which the makers themselves know nothing as to its effect on industry. Neither does anyone else at this time.

The social security act is another, the full import of which can not be seen at this time; nor does anyone know if it will stand the test of the Supreme Court. However, as Mr. Ahearn said: "It seems to be a settled political doctrine that government, through heavy taxes, must provide relief for the unemployed and for destitute aged persons. In the absence of a finding of constitutional invalidity by the Supreme Court, there is little reason to expect, regardless of which party controls the federal or state governments, that the social security act will be abandoned. Indeed, there is cause for apprehension in the fear that the present act, drastic as its levies are, will be modified by the legislators to provide even larger awards for those whom it is designed to benefit, all of which means that the cost to industry may be increased. The application of this legislative principle is one of the most acute problems now confronting American business."

#### Engineering and Research

Stanton Walker, director of the engineering and research division of the association, made a progress report which was largely an argument for more funds for more research. Particularly does he want to go into the field of bituminous mixtures, which he believes offers the largest potential field for the expansion of the sand and gravel market. He paid his respects to competition in this field as follows:

"Most of the publications of the National Crushed Stone Association on the subject have included comparisons of stone and gravel. The data have been interpreted by them as showing gravel in an unfavorable light. However, as I have pointed out in a recent communication to member companies, there is much room for differences in opinion as to the significance of the tests made.

In my judgement the emphasis has been placed on characteristics of the bituminous mixtures which are not of controlling interest.

"While engineers representing the users of our products think for themselves and have their own experiences and investigations to rely upon, such efforts on the part of the stone industry to discredit the use of competitive materials undoubtedly have an effect. Such efforts should be counteracted, and the only effective way to counteract them is to develop the facts in a comprehensive manner.

"Merely to match isolated facts appearing unfavorable to sand and gravel with other isolated facts appearing unfavorable to competitive materials is no solution to the problem. Such a procedure might arouse temporary interest but gets no place, confuses the issue, discredits the value of Association work, and presents a false picture of the function of research. While the final answers to all questions involved in bituminous mixtures will not give the sand and gravel industry a monopoly on that business, they will, I am most firmly convinced, permit sand and gravel to compete on a more equitable basis in the bituminous field."

Under the subject of "Concrete Road Construction," Mr. Walker said: "Let it be clearly understood that any penalties on the use of gravel in concrete road construction which are based on shape of particle are not justified. To do justice, it should be said that few such penalties are now assessed. However, in some localities, requirements for gravel, as compared with those for crushed stone, lead to the inference that gravel as a class is considered as inferior to stone as a class, whereas the discrimination actually is based on differences in characteristics of two groups of aggregates, one of which happens to be predominantly gravel and the other of which happens to be predominantly crushed stone.

"Obviously, such blanket discriminations, while perhaps supportable for average conditions in a particular locality, lead, when generally applied, to injustices. Any differentiation between aggregates should be made on the basis of their performance without regard to arbitrary classification. While the latter condition represents the case in most states, there still remains much work to be done in placing specifications and the design of concrete pavement slabs on a more rational basis."

The matter of the resistance of concrete to high temperatures which has led to discrimination in the selection of aggregates also needs clarification, and this is important in view of the activity in rewriting building codes at this time.

#### Entertainment

The director and guests who attended the St. Paul meeting will ever remember the perfect hospitality of Joe L. Shiely and Mrs. Shiely, who entertained at their summer home at Prescott, Wis., some 30 miles east of St. Paul.

## Trophy Winners

**Warner Co.**, Van Sciver plant, Bucks County, Penn., won the National Sand and Gravel Association safety contest in 1935—the fourth time it has won in the more than 100,000-man-hour class, and once in the less than 100,000 class. In 1935 it operated 124,767 man-hours without a lost time accident.

**American Aggregates Corp.**, Green Oak plant, Livingston County, Mich., won the trophy in the less than 100,000-man-hour class, with 68,135 man-hours and no lost-time accident. The same plant won honorable mention in 1933.

**Rock Products** bronze trophy will be awarded the winning plants at the annual convention of the National Sand and Gravel Association in Memphis, Tenn., next December. The contest is supervised by the U. S. Bureau of Mines.

**Twenty-five plants** in the low unit were awarded honorable mention for operating without a lost-time accident during the contest year. Honorable mention was not awarded to any plant in the high unit, because no plant, other than the winner of the trophy was successful in operating without an accident.

## Fatal Accident

**Tri-County Sand and Gravel Co.**, Seminole, Okla., had a fatal accident to an employe on June 24. The employe was a new man, 29 years old, given his first try as a truck driver. He was killed when the raised truck body fell back on him. Fellow workers said the accident must have occurred when the man started to let his bed down after dumping out his first load. Instead of going to the cab to release the catch on the hydraulic dump, they said, he apparently attempted to release it by pulling the line behind the cab, as truck drivers often do. While bending over the chassis, the bed apparently snapped down on top of him. A crushed chest caused his death.

## New Development

**Joe Simonic**, Victorville, Calif., is developing a high grade silica deposit, adjoining the Southwestern Portland Cement Co.'s quarry, for Emsco, Los Angeles, manufacturers of refractories.

## Black-Top Plant

**Hughes-Collins Co.**, Des Moines, Ia., has established a new "cold pack" asphalt paving mixture plant using a converted concrete mixer at S. E. Seventh and Racoon streets. E. T. Collins is general manager.

## New Plant

**Fred Austin**, Lynnville, Ind., has opened a limestone quarry and established a crushing plant at West Franklin.



San Francisco Chronicle Photo  
Mrs. Helen Wills Moody and E. J. Mehren at San Francisco luncheon

## Business and Sports

**Portland Cement Association's** president, E. J. Mehren, was speaker on the same luncheon program at San Francisco, Calif., July 8, with Mrs. Helen Wills Moody, tennis champion. The luncheon meeting was that of the San Francisco Advertising Club. According to the *San Francisco Chronicle*, Mr. Mehren divided people into two groups: wealth-creators and wealth-dividers. The former included farmers, merchants, manufacturers, workers; the latter, labor-leaders, politicians, clergymen, professors.

Economic progress, he said, was due to the creators. The dividers, however, had somewhat silenced this important group by placing the entire onus of the depression on them.

It was up to the creators to regain "their natural economic leadership." The employer being the "natural leader of his employes," he should take them into his confidence, "explain his profit and loss statements, why surpluses are necessary, etc."

A businessman who cannot do this is profiteering, he claimed, and will "drag himself and others down."

Progress depends on creation of more wealth and therefore he deduced wealth-creators should take the lead in molding public opinion. Fair distribution is also necessary for advance.

## Gypsum for Florists

**Gypsum Association**, Chicago, Ill., has found pulverized gypsum useful for treating rhizome rot of Iris, and has issued an information circular on the subject.

## Fire Loss

**Southern Rock Asphalt Co.**, Ardmore, Okla., plant was destroyed by fire on June 19, with an estimated loss of \$50,000, partly covered by insurance. An emergency plant was immediately put in operation, pending rebuilding.

# New Definition of Portland Cement— Other Things of Interest to Rock Products Producers at A. S. T. M. Annual Meeting

By H. F. Clemmer  
Washington, D. C.

**T**HE MEETING of the American Society for Testing Materials recently held in Atlantic City, N. J., proved to be a most successful and interesting convention. Many papers presented on the program and the reports of the committee activities are of particular interest to the readers of this magazine.

The attendance at the meeting was the largest in the history of the Society, save for the meeting in Chicago, held in conjunction with an equipment exhibit.

A. C. Fieldner, chief engineer, Experiment Station Division of the U. S. Bureau of Mines, was elected president for the ensuing year; T. G. Delbridge, manager, Research and Development Department, Atlantic Refining Co., was elected vice-president.

Dr. Arthur L. Day, director, Geophysical Laboratory, Carnegie Institution, Washington, D. C., delivered an especially interesting talk as the Edgar Marburg lecturer, on the new developments in the manufacture of glass, referring particularly to the success attained in the recent pouring of the enormous telescope lens which is now in the process of being polished.

## Asphalt Fillers

"The Effect of Mineral Fillers on the Serviceability of Coating Asphalts," by O. G. Strieter, research associate for the Asphalt Shingle and Roofing Industry at the National Bureau of Standards: Mr. Strieter reports on the durability of filled and unfilled coating asphalts, both in outdoor and in accelerated exposure. The tests show that, in general, the durability to weathering of coating asphalt can be improved by the addition of mineral fillers and that there is a difference in the effectiveness of various fillers. Fillers studied included mica, slate, talc, dolomite, limestone, trap rock, hydrated lime, and silica. The data also demonstrate the similarity between outdoor and accelerated exposures.

## Absorption Test for Sand

D. O. Woolf, of the Bureau of Public Roads, in reporting on the "Cone Method for Determining the Absorption by Sand," reviews tests made by twelve coöperating laboratories in determining the absorption by four methods: the Kerosene method, A.S.T.M. Tentative C95-33T, Cone method, and the visual inspection method. The basic principal of the cone method is that sand tamped into a small truncated cone mold will retain its form upon removal of the mold if free water is present; if, how-

## Editor's Note

**T**HE AUTHOR is well known as the engineer of materials, department of highways, District of Columbia.

The papers reported and abstracted cover:

Mineral fillers for asphalt.

Cone method for determining the absorption of sound.

Elastic and thermal expansion properties of concrete as affected by similar properties of aggregates.

Comparative shrinkage of gravel and haydite concrete.

Soundness tests of aggregates.

Quality of slag aggregate concrete.

Testing speed effect on strength and elastic properties of concrete.

Influence of low temperatures on cement hardening.

Volume changes in concrete.

Various other committee reports.

ever, the sand is surface dry, the sand will slump upon removal of the mold. Six sands of widely different origin, both as to locality and mineralogical composition, were used in the test series. In conclusion it is noted that the cone method appears to be the most satisfactory means of determining the absorption by sand. It furnishes more concordant results between different laboratories than any of the other methods under consideration, and permits an operator to check his own work with an average variation of less than 10%. This method has been adopted by the American Association of State Highway Officials, as well as by the Joint Committee on Methods of Test for Specific Gravity of Aggregates of the A.S.T.M. committees C-9 and D-4.

## Aggregates and Concrete

"Elastic and Thermal Expansion Properties of Concrete as Affected by Similar Properties of the Aggregates," by L. H. Koenitzer of the Kansas State College: The elastic properties and thermal coefficient of expansion were determined on specimens cut from samples of stone, and on concrete specimens containing crushed stone as coarse aggregate. Tests were made on the stone and concrete specimens in a dry condition, frozen in a dry condition, heated to 190 deg. F., in a moist condition and frozen in a moist condition. The data presented indicate engineers should not draw

conclusions from the results secured upon individual materials that enter into concrete mixtures, such as the change in volume or the elastic properties of the aggregate, cement, or mortar, since a combination of these materials may give an entirely different set of results in the concrete, depending upon the condition of the specimens at the time of testing; that is, if they are in a moist or dry condition, or if frozen or heated to a high temperature.

## Shrinkage of Concretes

Prof. F. E. Richart and J. E. Keranen, of the University of Illinois, reported on a series of tests comparing "Shrinkage of Haydite and Ordinary Sand-gravel Concrete." It is evident from this series of tests that haydite concrete does not follow the general relation between water loss and shrinkage. During early ages there is high moisture loss and relatively little shrinkage of the haydite mixtures, at two years; however, the shrinkage exceeds that recorded for sand-gravel concrete. The authors conclude that the probable reason for such behavior is due to the higher water-cement ratio required to secure concrete of the same consistency as that of the sand-gravel concrete—this greater unit water content being necessary due to the porous structure of haydite.

## Soundness Tests

Stanton Walker of the National Sand and Gravel Association in reporting on the present "Tentative Methods of Test for Soundness of Aggregates," using sodium and magnesium sulphate, stresses that the methods should be modified or used only as a guide in determining quality, and not as a basis for rejection. It is further pointed out that research studies—using actual behavior as a basis for comparison—have not advanced to such a state as to justify the insertion of arbitrary limits as to soundness in aggregate specifications. Attention is called to the difficulty experienced in obtaining uniform results; discrepancies arising due to variation in the temperature of the sulphate solution and its degree of concentration.

## Slag Aggregate

Tests conducted under the direction of Fred Hubbard of the National Slag Association on some 1600 cylinders and 500 beams, on specimens up to five years of age, show that slag, crushed stone and gravel aggregate all produce concrete of comparable quality. This report is a progress report following one presented five

years ago under the sponsorship of Committee C-9 in which it was shown that the abrasion test results were not indicative of the quality of slag for concrete. The unit weight per cubic foot is the significant requirement which best determines the quality of slag for concrete.

#### Fast Testing—Higher Strengths

"The Effect of Testing Speed on Strength and Elastic Properties of Concrete," by P. G. Jones and Prof. F. E. Richart, of the University of Illinois: Tests were made to study the effect of speed of testing upon the compressive strength and the stress-strain relation for plain concrete. Tests were made on three grades of concrete, at ages of 7 and 28 days. Loading of a 6 by 12-in. cylinder to failure was accomplished in periods of 1 second, 5 seconds, 20 seconds, 1 minute, 2 minutes, 10 minutes, 30 minutes, 1 hour and 4 hours, with corresponding rate of stress application ranging from 3870 down to 0.12 lb. per sq. in. per second. Both load and strain were measured by means of telemeter gages of the carbon resistor type. The test results indicate that the strength increases with increase in speed of loading, the ratio of strengths for the highest and lowest rates used being about 1 1/3 to 1. The secant modulus of elasticity at 90% of the maximum load also increased with increase in rate of loading. This indicates that a part of the measured strain in the tests is due to creep; the amount of this creep increases with the length of time involved in the test. Additional data indicating that the amount of creep is not proportional to the intensity of stress were obtained from a few special tests, in which the oscillograph record permitted observations of creep from the instant at which a load increment was applied.

#### Low Temperature Curing

J. C. Pearson, director of research, Lehigh Portland Cement Co., presented an excellent abstract of the paper on "The Influence of Low Curing Temperatures on the Hardening of Cement Mortars," prepared by S. A. Mironoff, of the Central Institute for Industrial Building Research, Moscow, U.S.S.R. The value of low temperatures (2 deg. C.), immediately after placing concrete, during curing in increasing the ultimate strength of the concrete was brought out by the results reported by Mironoff. This phenomenon is undoubtedly influenced by the effect of varying temperatures on the solubility of lime. P. H. Bates, Bureau of Standards, reported on tests made on cements manufactured in the United States which showed considerable difference in the strength results obtained from specimens of different cements and subjected immediately upon placing to curing under low temperatures (37 deg. F.) as well as normal temperatures; and later to steam curing. The results of these tests quite definitely indicate the value of steam curing to be dependent on the particular cement used.

The presentation of these papers indicates the importance of the need of study as to the most efficient curing conditions.

#### Cement Defined Again

The adoption of a new definition for cement—which is in fact only a change in limitation as to chemical composition—which directly affected the specification for high-early strength cement elicited considerable discussion. This specification for high early strength cement was recommended to the Society for advancement to Standard by Committee C-1. The definition as offered by the committee is as follows:

"Portland cement is the product obtained by pulverizing clinker consisting essentially of calcium silicates, to which no additions have been made subsequent to calcination other than water and/or untreated calcium sulphate except that additions not to exceed 1% of other materials may be added, provided such materials have been shown not to be harmful by tests prescribed and carried out by Committee C-1."

Note: Tests to determine whether a proposed addition is harmful will be carried out by Committee C-1, for those making requests through its Cement Reference Laboratory or other laboratory which the committee may select. As such tests are completed the committee will make known those additions which have been found not to be harmful.

The Committee on Cement had previously proposed specifications for high-early strength "treated" portland cement as well as similar specifications for untreated cement. The adoption of this new definition for portland cement, however, will eliminate the need of two specifications inasmuch as it permits "small additions" of materials which it is stated will assist in producing cements of higher early strength and having other desirable qualities.

#### Volume Changes

An excellent report was submitted by the working committee on volume changes and soundness of portland cement. Specimens were stored in air under controlled humidity and temperature conditions, over boiling water under varying conditions, and in an autoclave for different periods of time. It appears that the free lime is the principal cause of expansion of cement. The results so far obtained indicate the possibility of developing a much improved standard method of test for soundness of cement, and justifies continued study, which has been initiated with several cooperating laboratories.

#### Many Laboratories

The value and importance of the work being carried on at the cement reference laboratory at the National Bureau of Standards, particularly that accomplished by the inspection tours of laboratories, was brought out in a report submitted by G. E. Warren, chairman of that committee. Two hundred sixty-four laboratories have requested inspection for the current (5th) inspection tour; twenty of these requests are from new laboratories.

#### Limestone—Lime

An attempt was made to have the autoclave method of test for soundness withdrawn from the Tentative Methods of Physical Test for Limestone, Quicklime and Hydrated Life (C110-34T), but the Society considered this test of value and that it should remain in the specifications until such time as a more efficient method was proffered. It is expected that specifications for Hydraulic Lime may be submitted for consideration of the Lime Committee at the next meeting.

#### Soil Stabilization

A sub-committee of D-4 on Road Materials was organized about three years ago to study the stabilization of soils for road purposes. This sub-committee has been successful in assembling and having recommended to the Society for standardization methods of tests for identifying characteristics of soils for use in road construction.

The advancement of the study of stabilization of soils should directly interest all aggregate producers. It has been shown that careful control of these materials is necessary for successful results. Many producers have arranged for scientifically prepared pre-mixed stabilized soil in the same manner as pre-mixed concrete has been developed.

#### Beam Tests of Concrete

It has been recommended through Committee C-9 that the existing method of making flexure test of concrete using a simple beam with center loading (C78-30T) be withdrawn and that a new test method utilizing the 3rd point loading method be adopted in lieu thereof.

#### Fine Aggregate

The grading requirement for fine aggregate have been revised as follows:

	Original	Revised
Passing 3/8-in. sieve	100%	100%
Passing No. 4 sieve	85-100	95-100
Passing No. 16 sieve	45-80	45-80
Passing No. 50 sieve	2-30	5-30
Passing No. 100 sieve	0-5	0-10

#### Flow Test of Concrete

The proposed method of test for determining the flow of portland cement concrete by the use of the flow table has been adopted as tentative.

#### Coal in Sand

The proposed method of test for determining coal and lignite in sand has also been adopted as tentative—this method utilizes the flotation process as a means of separation; carbon tetrachloride being used as the separating medium.

#### Joint Committee

The Joint Committee on Concrete and Reinforced Concrete made no formal report but it is expected their report will be completed by this fall. Mr. Lindau has been assisting the committee for some time in editing and correlating the work of the various sub-committees.

# Lime Producers' Forum

Conducted by Victor J. Azbe,  
Consulting Engineer, St. Louis, Mo.

## THE PROBLEM of LIME-KILN REFRACTORIES Approaching Final SOLUTION

**T**IME is fast approaching when one of the most vexing problems the lime producer had to contend with will not be a problem any more. The very radical change that has taken place in heat application, together with the great improvements made by the refractory manufacturer, the two working to the same end, will result in a great benefit to the lime industry.

Heretofore the lime manufacturer was greatly handicapped, for any betterment in combustion, any increase in capacity, quite likely was reflected in shorter and indefinite kiln lining life. The refractory, along many lines, was the element that limited progress.

We may cite an example. One of the most interesting plants ever built was designed by Schmatolla for Col. C. W. S. Cobb, of the Glencoe Lime and Cement Co. some 22 years ago. This plant, when the writer first tested it, some 15 years ago, performed in all except one respect exceedingly well. The gas producers delivered a gas that no better was possible. The  $\text{CO}_2$  in this gas was only 1 to 2% and the CO in excess of 30%; and this quality was uniform. The exit gases were very good and consistent in analyses. The lime drawn was cold, capacity was really exceptional, but with all this the installation was a failure for even the very highest grade, most expensive fire brick would slag away in but a few months' time. The highest alumina clay refractory on the market was used and the hot zone was even lined with carborundum brick at a cost of over a dollar a brick, but all to no avail. It is little wonder, too, as the hot zone was operating under high pressure and temperature that reached 3000 deg. F. when the thermocouple wires melted. This is an extreme case, of course, but there were many other plants, and still are, having a high refractory cost or where performance is limited by the refractory.

However, neither the kiln designer nor the ceramist considered themselves defeated. One worked from one end, arranging kilns so that good results could be obtained with the best refractory obtainable, the other continually tried at improvement of the refractory, and it appears that now, through the efforts of the two, working from two ends to the middle, the refractory problem has just about become mastered for good.

### Great Improvements Recently

The kiln designer and the ceramist both had a long buggy ride, they covered much territory, sometimes they did not even know which way they were going, but they arrived. In the latest kiln designs, either producer or natural gas is introduced through

central gas burners completely removed from the walls, which makes an immense difference in operation, and all favorable. The refractory manufacturer, through great expenditures in research and for immense presses and vacuum systems and other complicated equipment, managed to evolve a better brick for less money, just like the tire manufacturer produces a better tire for less.

Much of this was brought out at the recent annual meeting of the National Lime Association. The meetings of this organization are peculiar and, unfortunately for the industry, at great variance with the meetings of many other similar organizations. Problems of production are studiously ignored, probably because some manufacturers do not want their mysteries to become known, which, however, are all very shallow and most not worth knowing anyway. As a consequence, the meetings are generally of interest to sales managers, but of no interest to engineers and production men. This, of course, has become generally known, and the audience shows it.

Although there was talk that there would be an "Operator's Round Table," which induced the writer to go to Hot Springs, there was really little discussion of operation. Somehow, however, there was one paper of value to operating men presented by R. P. Heuer, director of research, and L. P. Trostel, chief chemist, General Refractories Co. It is unfortunate that space is not available for a rather thorough abstract. However, the dreams expressed in the rather lengthy study of the writer, presented in *Rock Products*, November and December, 1931, appear here to have become realized.

### Technique in Refractory Manufacture

What the lime manufacturer needs is a brick of high density, of low absorption and slag penetration. With it he needs a brick of high compressive strength and high resistance to abrasion and spalling, and of low shrinkage. As to how this manufacturer obtains that, we had better quote from the paper.

"Sized grains to increase density are used in a number of refractories now available. Usually the raw or calcined clays are ground, and the grains of certain sizes screened out and remixed in definite proportions found best from experience. From experimentation, it has been found that mixtures consisting of about 55% coarse and 45% fine particles make the most dense brick.

"Mixing has been improved so that the

plastic part of the fireclay batch is more effectively rubbed or coated on the non-plastic particles, particularly in processes where the amount of moisture in the batch is low.

"Brick presses equipped for vacuum-deairing and using greatly increased moulding pressures are in use. These improvements have resulted in brick of higher density and strength and the elimination of practically all lamination planes.

"One manufacturer uses patented sizing machines which trim the brick made by the stiff mud process before firing, producing a product which meets closer tolerances and possesses uniformity and trueness of shape. An important advantage of such brick is that they can be laid up with very thin joints.

"Very much less moisture has been found necessary in most brick batches. The high shrinkage and strains attendant upon moisture removal during drying are thus largely eliminated and stronger brick result.

"Burning temperatures are now more closely controlled to fit the individual burning characteristics of various clays. This results in more complete elimination of the after-changes in service evidenced as shrinkage or expansion. In some types of aluminum-silicate refractories, this improved firing practice frequently has the effect of increasing the amount and size of mullite crystals which improve the strength of the brick."

Several lime plants have tried the newer denser brands of refractories with very good success, and looking forward, while judging by past progress, the time is not far away when fuel ratios will be higher than ever and a capacity of one ton of lime per square foot of shaft area will be common.

\* \* \* \*

### Timing of Lime and Gas Through the Kiln

**Inquiry:** We are interested in designating certain small runs of stone in such a way that they can be recognized after they have gone through the kiln. Any marking will do just so long as it is not rubbed off or burned off.

**Answer:** It is possible that some reader may be able to suggest some sort of marking that would remain while stone is passing through kiln, as nothing suitable is known to us. Whenever we wanted to follow something through, it always was for the purpose of timing the flow, which was done by throwing branded bricks into the specific sections and watching for them in the draw. Much can be learned in this way.

While in the ideal kiln all markers put in at one time should come out at the same time, that seldom happens, and very often they may come through quite far apart. As they have to travel with the stone and lime, it indicates that the downward flow is not uniform, faster by far in some sections than in the others. At times the appearance of

the brick indicates that they passed through high heat, while another brick charged at the same time may show little evidence of heat. This proves that some kiln sections are much hotter than others, which also is an undesirable condition.

It may be that the brick delayed in coming through passed through the hottest section and there may be hardly anything left of it. Lime that carried this brick naturally must have been overburned. The reverse is true in the case of lime that carried the brick that came through unscathed.

Studies were also made of gas flow and small bombs of magnesium powder were exploded. The fine magnesium oxide entered the gas stream instantaneously and was carried by the gases wherever they went. By observing the top of the kiln and timing the appearance of the white smoke, much could be found out about the flow through the kiln. In the ideal kiln the duration of the white smoke would be very short, indicating that the flow is uniform over the entire kiln cross-section. When some of the smoke appears much sooner than the main cloud, it indicates a channel within which lime may be in that kiln almost up to the storage zone. If the main cloud appears and then some smoke keeps coming for a considerable period, it indicates that the kiln has a comparatively unheated zone, which most likely is responsible for most of the core.

### New Lime Promotion

Hassinger-O'Brien, Bellefonte, Penn., is reported to have obtained a lease on limestone property in Buffalo Run valley, west of the new plant under construction for the Chemical Lime Co., and are promoting still another rotary kiln lime plant, according to the *State College Centre Times*, which reports:

"According to the prospectus, M. J. O'Brien, Pittsburgh, and H. P. Hassinger, Bellefonte, are the trustees for the Hassinger-O'Brien lease, the assets being shown as \$1,131,877. The organization is to have a novel financial set-up which, instead of being a partnership, company, or corporation, is a trusteeship. Management and control of the organization will be concentrated in the trustees, together with a small executive committee regularly elected by the majority vote of participating interest holders.

"M. J. O'Brien is designated as chairman trustee while Mr. Hassinger is trustee of the organization. The sole purpose of the company is to develop the Watson tract and the building of a lime plant for the production of limestone and lime products.

"The leased tract is made up of a deposit of limestone having the following characteristics: virgin stone with surface intact, approximately one mile in length, and located along the main line of the Bellefonte Central railroad. It contains a stony body 65 ft. wide, and it is estimated that the depth of grade stone exceeds one mile.

"When the work begins, it is proposed to begin at once the opening of a mine 800 ft. deep. This mine, it is said, will provide ample stone to keep the plant in operation for many years. When the supply has become exhausted, the mine will be lowered to almost any depth to supply additional stone. The stone is part of the famous 'Bellefonte Ledge' of limestone, widely known for its purity and its high calcium content."

### Ribs the Governor

Superior Lime and Hydrate Co., Pelham, Ala., president, H. G. Bridgewater, wrote an open letter to Governor Bibb Graves of Alabama in July, that received wide attention in the community newspapers of the state. Mr. Bridgewater took the governor to task for not furnishing protection against violence by strikers, black and white.

### New Superintendent

Kelley Island Lime and Transport Co., Cleveland, Ohio, has appointed E. B. Schmidt superintendent of its Gibsonburg, Ohio, plant, succeeding the late John Mutchler. Mr. Schmidt was promoted from bookkeeper.

### Putty Plant

Warner Co., Philadelphia, Penn., has completed and placed in production its second Brooks-Taylor lime putty plant. The new plant is in the Beach and Berks St. yards of the company in Philadelphia and similar to the plant built at Wilmington, Del., described in *Rock Products*, January and February, 1936. Some improvements were made in the second plant, however.

### Fiftieth Anniversary

Kelley Island Lime and Transport Co., Cleveland, Ohio, was a full-page advertiser in the centennial edition of the *Cleveland Press*, July 21. This year is the 50th anniversary of the Kelley Island company.

### Display Rooms

United States Gypsum Co., Chicago, Ill., has leased space at 438 Ward Parkway, Kansas City, Mo., for offices and display rooms.

### Asphalt Mixing Plant

Northern Asphalt Products Corp., Grand Rapids, Mich., has established a new plant at Ferryburg, Mich., to make paving mixtures. The company is a consolidation of the Northern Bitumen Co. and the Municipal Contracting Supply Co., both of Grand Rapids.

### Specially Honored

Best Bros. Keene's Cement Co., Medicine Lodge, Kan., will be given special recognition for its unique contribution to the state's industrial progress, at the Kansas Diamond Jubilee Exposition, Wichita, October 7-17. The Medicine Lodge plant is said to supply 60 to 70% of the entire consumption of Keene's cement in the United States, and shipments are made to Canada, New Zealand, Australia, China, and half a dozen other foreign countries.

### Fire Loss

Harris Clay Co., Spruce Pine, N. C., mica drying and recovery plant was destroyed by fire June 29. The plant will be replaced immediately.

### Production Increased

Huron Portland Cement Co., Alpena, Mich., plant, added four kilns to production late in June. These kilns are part of the old plant and had not been operated for several years. Four modern kilns have been operated more or less regularly.

### Road Information

Asphalt Road Construction; by The Asphalt Institute, New York, N. Y. Manual No. I, Road-Mix Types. This issue is a small, compact pamphlet designed to provide engineers and contractors with the essential information necessary to construct each type of bituminous highway. It deals specifically with the graded aggregate and macadam aggregate types of mixtures, giving rules to determine which type of construction to use, type of asphalt needed, ideal methods of application, and such.

### Resurrected

Cleveland Quarries Co. is reported to be operating its sandstone quarry in West View, near Berea, Ohio, for grindstone blocks for the first time in nine years. It took two weeks to pump out the quarry.

### Beg Your Pardon!

Western Sand & Gravel Co., Spring Valley, Ill., which has recently completed extensive improvements, has been a rail shipper from the start. The item on page 49, June issue, that the company had been exclusively a truck shipper was in error. Mr. Glenn Sitterly, vice-president and secretary, informs *Rock Products* that his company has "always cooperated with the carriers in attempts to keep tonnage to rail shippers and the carriers. Especially during the past three years have we cooperated fully in attempting to retrieve that big percentage of business which has been lost to rail shippers and the carriers by the production of local and road-side plants operated by units of government."

# Digest of Foreign Literature

By F. O. Anderegg,

Consulting Specialist, Newark, Ohio

**The Disadvantages of Present (German) Standard Specifications for Cement** has become a matter of much concern to Walter Dyckerhoff, who had just returned from a trip to the United States, and who put in a strong plea for revision. In Germany a number of blended cements have appeared on the market, which meet the German standards very nicely. D. claims the following faults with that method and points out that the American specifications are giving similar troubles: the sized sand permits too much of the cement to act simply as filler, the water (about 8%) is far below the amount used practically, and the method of packing with 150 blows of a heavy hammer is never even approximated in practice. He would like to see one weight of graded sand added to two weights of standard sand and 15% water used in all tests. Dyckerhoff is strongly of the opinion that for practical concrete work no cement is better than a properly made portland cement and is extremely anxious to have specifications set up which will bring the test results more in line with practical concrete results, so that portland cement shall have a chance to make a proper showing. The unsatisfactory tensile test should be replaced by a flexural test. His remarks received support from a report by Otto Graf, **The Choice of Cements for Concrete Roads and Some of the Questions Involved**, also presented at the March meeting of the German Portland Cement Manufacturers Association. A large number of cements was tested both by the standard method and also with a plastic mortar test and ratios were found varying from 1:0.6 to 1:0.9. At 28 days the range of compressive strengths was 3200 to 6400 lb. sq. in. for plastic mortars and in flexure from 700 to 1400. It was observed that certain cements of similar compressive strength differed considerably in flexural. The tests made with the greater water content have developed much greater differences among the cements than the standard methods; for instance, compare the above range for flexural strengths with tensile tests made on pounded-in, earth-dry mortars ranging from 510 to only 710 lb. sq. in. Shrinkage tests after 28 days ranged from 0.03 to 0.075%, but showed no correlation with the strength results, although they did seem to vary with the moisture loss.

As to the fineness of grinding, G. prefers for equal strength and shrinkage the coarse ground cement, but points out that owing to lack of close connection between fineness and other properties of cement, for each cement, tests should be made to determine the optimum fineness. There should be at least a residue of 5%

on the 176-mesh sieve. Great emphasis was laid not only on securing uniformity in the technical product, but also for the testing so that statistics may be gathered.

The next paper was read by Dr. Haegermann on **The Chemical Composition of Portland Cements for Concrete Roads**. After carefully considering a variety of admixtures which have been proposed for the amelioration of portland cement, including stone dust, bituminized admixtures or atomized bitumens, bitumen emulsions or chemicals, H. came to the same conclusion as Dyckerhoff, that nothing begins to compare with good portland cement. For concrete roads cements with plenty of tricalcium silicates are much to be preferred to those rich in disilicate. While the chemical composition does have some importance, e.g., keeping the alumina reasonably low to reduce shrinkage tendency, the degree of burning is almost more important, as was demonstrated by figures for cements of a uniform raw mix, but burned to different degrees. The effect of lower burning, even when the products were sound, was found to have a seriously adverse effect on the flexural strength. In regard to chemical composition Dr. Haegermann has come to the conclusion, opposite to that reached by the Italian, Ferrari, that the iron content should be controlled so that the alumina-iron oxide ratio should lie between 1.4 and 1.8. Arrangements have been made with the Reichsbahn and several German cement manufacturers to try out on a large scale the effect of varying this ratio.

The next address was given by Dr. Schweite on **Researches in the Development of Concrete Road Cements**. He echoed previous speakers about admixtures and also attacked the problem of improving the cement itself. By making experimental burns on a large enough scale in a commercial kiln he was able to show a very good correlation between trisilicate content and good strength and lower shrinkage. The effect of fine grinding was next considered and it was found that strengths and elasticity varied with the specific surface, as did shrinkage. In one example, coarser ground cement had reductions of 10% in flexural strength, 18 in compression-elasticity, 20 in compression strength and 30% reduction in shrinkage. Tests were then described on an admixture being pushed in Germany which consisted of 50 to 60% ground quartz, 20 to 30% blast furnace slag and about 20% of some other finely ground stone, and selling at a price twice that of portland cement, but failing to give any

advantage over straight portland in his tests.

Prof. Eitel spoke about **Magnesia Rich Cements**. A patent had been granted to K. Balthaser for a sound cement containing a large amount of magnesia and at least 10% iron oxide. This involves the five component system,  $\text{CaO-MgO-Al}_2\text{O}_3\text{-Fe}_2\text{O}_3\text{-SiO}_2$ , and this had been studied by Dr. H. zur Strassen, with special reference to the condition of the magnesia. This depends chiefly upon the lime content, and in the presence of the trisilicate, MgO is only found in the free state, that is, as periclase. Calcium ferroaluminate takes up only 2% of its weight of MgO, which inclusion gives a green color to the clinker. The magnesia, when already in combination, as in blast furnace slag, undergoes rearrangement with merwinite as intermediate product, to end up as periclase. As to the Balthaser cement, some doubt was raised as to its staying permanently sound. *Tonindustrie Zeitung* (1936), 60, No. 28, p. 363; No. 29, p. 378; No. 30, 31, p. 390. *Zement* (1936) 25, No. 14, p. 216 (Haegermann); p. 218, (zur Strassen).

**The Comparison of Different Formulas for the Prediction of Concrete Compressive Strength**. Among previous formulas, Abrams has proposed an exponential curve, Graf an hyperbolic, Feret, Talbot and Suen-son a parabolic, and Bolomey a straight line relationship. These formulas have been applied by L. Palotas of Budapest University to a large number of cube strengths obtained at 28 days with combined storage (7 days moist, then dry), the specimens being made from Hungarian good quality cement and local aggregates of variable gradings. The amount of cement and water in the mixes varied within wide limits, and consistencies ranged from fluid to earth dry. The results were plotted against the cement-water factor, the cement-void factor and against the cement-water factor corrected for the pore volume at 24 hours,  $u = 1/(w + p/s)$ , where  $w$  is water-cement factor by weight,  $p$  the pore space at 24 hours and  $s$  is the cement-water ratio by weight. The deviations of the actual experimental values from these formulas are as high as 30%, but when correction is made for the pores, the formulas can be used in the earth-dry range, while without such correction, they are limited to workable mixes. All of the equations contain constants which depend upon so many factors, including quality and amount of the cement, nature and grading of the aggregates, method of curing, etc., that it is not surprising that such large deviations occur from the equations. In other words, the equations are merely simplified approximations, but are probably as good as the present state of the art warrants. It is obvious that, with so complicated a system as concrete, several more variable terms will have to be added to any equation to give a completely satisfactory basis for predicting concrete strength. *Zement* (1935) 24, No. 36, p. 565; No. 37, p. 579.

**Protecting Concrete in Sea Water.** This problem engages attention of the European cement technologists. Richard Grün of Düsseldorf reports the results of experiments covering some five years, and inclines toward bituminous surface applications, but points out carefully that great variations are obtainable and careful tests should be made before choosing. Important properties for the protecting medium include: viscosity and density, drying characteristics and workability, elasticity and covering power, as well as acid resistance. It is desirable to have the concrete as dry as possible before application, especially when cut-back asphalts are used and the application should have as long a period as feasible for drying out before contacting the sea. Certain tar products have given good results, but the addition of pigments to form mastics has been found generally beneficial. *Tonindustrie Zeitung* (1935) 59, No. 96, p. 1185; No. 97, p. 1202; No. 98, p. 1213.

### Recent WPA Contract Prices

RECENT contracts let by the Chicago, Ill., office of the Works Progress Administration for crushed stone of various sizes were as follows (all prices delivered on the job unless otherwise noted):

#### Crushed Stone

Consumers Co., Chicago, 250 tons screenings @ 70c; Fairmount Quarries, Fairmount, 175 tons limestone @ \$1.29; Dolese and Shepard Co., Chicago, 1875 tons Federal specification limestone screenings @ 74c, 6500 tons crushed stone @ 83c, 500 tons @ 83c and 1000 tons @ 83c; Anna Quarries, Anna, 266½ cu. yd. limestone (f.o.b. cars shipping point) @ 88c; Dolese and Shepard Co., Chicago, 88 tons limestone @ \$1.19; Allied Construction and Supply Co., Chicago, 38 tons screenings @ 93c; Moulding-Brownell Corp., Chicago, 494 cu. yd. limestone @ \$1.65; Morris Limestone Products Co., Morris, 800 cu. yd. limestone for traffic bound surfacing @ \$2.50; Consumers Co., Chicago, 500 cu. yd. limestone @ \$1.15 and 12,500 tons limestone @ \$1.10; Moulding-Brownell Corp., Chicago, 301 cu. yd. screenings (f.o.b.—WPA trucks) @ 70c and 5000 cu. yd. limestone (f.o.b.—WPA trucks) @ \$1.10; Anna Quarries, Anna, 275 tons limestone (f.o.b. cars shipping point) @ 68c; Material Service Corp., Chicago, 300 cu. yd. limestone chips (f.o.b. bidder's yard) @ \$1.28; Moulding-Brownell Corp., Chicago, 5000 tons limestone (f.o.b. cars shipping point) @ 52c; Anna Quarries, Anna, 2000 tons limestone (f.o.b. cars shipping point) @ 79c; O. M. Smith, Hume, 1500 cu. yd. limestone @ \$1.49; Anna Quarries, Anna, Ill., 300 tons (f.o.b. cars destination) @ 90c; Moulding-Brownell Corp., Chicago, 4375 tons limestone @ \$1.24 and 150 cu. yd. @ \$1.85; Material Service Corp., Chicago, 125 cu. yd. screenings @ \$1.70; Lincoln Crushed Stone Co., Joliet, 1200 tons limestone @ \$1.86; Moulding-Brownell Corp., Chicago, 1500 cu. yd. crusher run

stone @ 95c, 2000 cu. yd. limestone @ \$1.00 and 256 tons limestone @ \$1.12; East St. Louis Stone Co., East St. Louis, 11,261 tons limestone (f.o.b. cars, shipping point) @ \$92.1c; Hill-Thomas Lime and Cement Co., East St. Louis, 9000 tons limestone (f.o.b. cars shipping point) @ 55c; Lehigh Stone Co., Kankakee, 1650 tons (f.o.b. cars shipping point) @ 55c and 2000 tons @ 55c; G. H. Hartong, Chicago, 1700 cu. yd. crusher run stone @ 80c; Dees Bros., Oblong, 3340 cu. yd. @ 54c; Moulding-Brownell Corp., Chicago, 280 cu. yd. @ \$1.40; Consumers Co., Chicago, 3500 tons screenings @ 65c; Wille Bros. Co., Building Material and Coal Co., Blue Island, 680 cu. yd. @ \$2.17; Allied Construction and Supply Co., Chicago, 2500 tons @ \$1.03 and 5000 tons screenings @ 67.5c; Moulding-Brownell Corp., Chicago, 100 cu. yd. @ \$1.65; Allied Construction and Supply Co., Chicago, 350 tons @ \$1.07; Dolese and Shepard, 300 cu. yd. limestone chips @ \$1.34; Lehigh Stone Co., Kankakee, 2000 cu. yd. (f.o.b. cars destination) @ \$1.59; Moulding-Brownell Corp., Chicago, 1462 cu. yd. (f.o.b. cars shipping point) @ \$1.00; Moulding-Brownell Corp., Chicago, 1500 cu. yd. limestone (f.o.b.—WPA trucks) @ \$1.00; Lincoln Crushed Stone Co., Joliet, 800 cu. yd. (f.o.b. cars destination) @ \$1.95.

#### Sand and Gravel

Material Service Corp., Chicago, 150 tons torpedo sand @ \$1.03; T. C. Tilley, Tower Hill, 500 cu. yd. gravel 1½ in. down @ 10c; Vincent Spencer Sand and Gravel Co., Belvidere, 100 cu. yd. pit run gravel 2 in. down @ 60c; Moline Consumers Co., Moline, 2400 cu. yd. pit run gravel (f.o.b. pit) @ 14c; Mrs. C. M. Buntain, Momence, 1500 cu. yd. 1 in. to ¾ in. pit run gravel (f.o.b. pit) @ 19c; Material Service Corp., Chicago, 250 tons Federal specification bank sand @ \$1.11; B. W. Livengood, Heyworth, 1500 cu. yd. 1½ in. minus pit run gravel (f.o.b. pit) @ 35c; Missouri Gravel Co., Moline, 260 tons (f.o.b. cars destination) @ \$1.00; London Mills Farmers Cooperative Co., London Mills, 62 cu. yd. gravel (f.o.b. cars destination) @ \$2.79; Material Service Corp., Chicago, 63 tons bank sand @ \$1.14; Moulding-Brownell Corp., Chicago, 100 tons sand (f.o.b. cars destination) @ \$1.30; Geo. F. Keller, Riverside, 200 cu. yd. torpedo sand @ \$1.62; John E. Walsh, Albion, 1500 cu. yd. gravel @ \$1.21; Consumers Co., Chicago, 1000 cu. yd. sand @ 88c; Edgar Trimble, Macon, 2999 cu. yd. pit run gravel @ 10c; Missouri Gravel Co., Moline, 465 tons gravel (f.o.b. cars destination) @ \$1.48 and 402 tons sand (f.o.b. cars destination) @ \$1.28; Missouri Gravel Co., Moline, 3580 tons pit run gravel @ 89c and 500 tons gravel (f.o.b. cars destination) @ \$1.00; Moulding-Brownell Corp., Chicago, 200 cu. yd. torpedo sand @ \$2.25; McGrath Sand and Gravel Co., Lincoln, 1700 tons pea gravel (f.o.b. cars at destination) @ 90c; Harry Riley, Shelbyville, 2000 cu. yd. pit gravel (f.o.b.—WPA trucks) @ 95c; Wil-

lard Burgoyne, Danville, 1000 cu. yd. pit run gravel @ 30c; Terre Haute Gravel Co., Terre Haute, Ind., 600 cu. yd. gravel (f.o.b. cars destination) @ \$1.61; Mt. Carmel Sand and Gravel Co., Mt. Carmel, 1000 cu. yd. gravel (f.o.b. cars destination) @ 90c; Missouri Gravel Co., Moline, 1200 tons gravel (f.o.b. cars destination) @ \$1.00; McGrath Sand and Gravel Co., Lincoln, 1400 cu. yd. gravel (f.o.b. cars destination) @ \$1.218; Moulding-Brownell Corp., Chicago, 1050 tons torpedo sand @ \$1.12 and 1275 tons washed gravel @ \$1.20; Ottawa Road Gravel Co., Moline, 2029 cu. yd. crushed gravel @ 70c; Dipper Bros., Decatur, 200 yd. sand @ 97c; Geo. H. Hartong, Chicago, 500 cu. yd. gravel (f.o.b. trucks bidder's yard) @ 95c; Harry R. Carlton, Morrison, 1225 cu. yd. crushed gravel @ 99c; Corey and Collinson Construction Co., Moline, 1346 cu. yd. gravel @ \$1.30; Williams Material Co., Streator, 5200 cu. yd. gravel (f.o.b. stockpile) @ 70c; Ray Martin, Ellisville, 7000 cu. yd. pit run gravel (f.o.b. pit) @ 10c; Material Service Corp., Chicago, 115 tons torpedo sand @ \$1.18 and 1650 tons washed gravel @ \$1.22; Consumers Co., Chicago, 1125 tons torpedo sand @ \$1.15; Elmer Larson, Decatur, 10,000 cu. yd. pit run gravel @ 30c; Material Service Corp., Chicago, 1600 cu. yd. crushed gravel @ \$1.63; Consumers Co., Chicago, 250 tons sand @ \$1.14; Material Service Corp., Chicago, 3750 tons torpedo sand @ \$1.11; H. A. Stoltze, Huntley, 1797 cu. yd. gravel @ 88c; E. D. Vester, Wyoming, 60 cu. yd., torpedo sand @ \$1.75; James Baxter, DeKalb, 1000 cu. yd. pit run gravel @ 75c; C. A. Mayes, Albion, 800 cu. yd. gravel @ \$1.52; Dees Bros., Oblong, 5000 cu. yd. gravel @ 57c; Parker Bros., Oakland, 2000 cu. yd. pit run gravel @ 35c; E. Larson, Decatur, 550 cu. yd. pit run gravel @ \$1.00; Material Service Corp., Chicago, 800 cu. yd. stone sand @ \$1.28; F. J. Zeller, New Douglas, 2000 cu. yd. branch run gravel @ 10c; F. Evans, Cerro Gordo, 1700 cu. yd. pit run gravel @ 17.5c; B. F. Morey, Clinton, Md., 3750 cu. yd. pit run gravel @ 13c; Central Gravel Co., Chicago, 2000 cu. yd. gravel (f.o.b.—WPA trucks at bidder's yard) @ 85c; Chillicothe Gravel Co., Chillicothe, 616 tons gravel (f.o.b. trucks at hopper) @ 55c; Material Service Corp., Chicago, 875 tons bank sand @ \$1.23; E. W. Van Zant, Brocton, 600 cu. yd. gravel (f.o.b. cars destination) @ \$1.43; A. Johnson Sand and Gravel Co., Rockford, 720 cu. yd. washed gravel @ \$1.48 and 455 cu. yd. torpedo sand @ \$1.38; Western Sand and Gravel Co., Spring Valley, Ill., 200 cu. yd. torpedo sand @ \$1.47, 400 cu. yd. washed gravel @ \$1.44 and 105 tons gravel (f.o.b. cars destination) @ \$1.39; C. J. Simpson, Charleston, 1056 cu. yd. gravel @ \$1.845; Consumers Co., Chicago, 300 tons torpedo sand @ \$1.10.

#### Ready-Mixed Concrete

E. E. Lilly and Son, Decatur, 52 cu. yd. @ \$8.95; 1575 cu. yd. @ \$9.79.

# Cement Products

TRADE MARK REGISTERED WITH U. S. PATENT OFFICE

## Lightweight Aggregate from Blast-Furnace Slag

**S**UPEROCK is the copyrighted trade name for a light weight concrete aggregate derived from molten blast furnace slag, which has just been introduced to the south, and is being sold for the manufacture of all types of concrete products.

The process of manufacture was first developed in Germany, and was introduced to the United States some ten years ago. The manufacturing plant is located at the blast furnaces of the Republic Steel Co., near Birmingham, Ala., and the Superock Company with offices in the Empire Building, Birmingham, handles sales of the aggregate.

### Manufacture

The plant built for producing the aggregate is new, and consists in the main of the slag machine for converting hot slag into an inert, cellular aggregate, conveyors, crushers and a sizing screen. Cars carry the molten slag from the furnaces and discharge directly to the special machine with 5 ft. diameter paddles, internally. The machine is patented and is manufactured by Edgar E. Brosius, Inc., Pittsburgh, Penn., and is driven at 900 r.p.m. by a 75 h.p. G. E. motor.

Water under 80 lb. per sq. in. pressure is introduced directly into the machine by means of a 3x2½ in. Allis-Chalmers pump. An "explosion" of gases takes place, and the expansion of these gases while the slag is still in a plastic state blows up the hardening slag into a mass of tiny cells, each separate from the others and surrounded by walls of very dense material. The rotation of the machine with its internal blades, breaks up the resulting lumps to varying sizes.

The machine has an output of approximately 60 tons hourly. Approximately 175 gal. of water are introduced to the machine to make one ton of aggregate. Steam passes to the air through a 4 ft. diameter by 30 ft. stack. The lumps of Superock while still very hot are taken on a 24 in. Goodyear special heat-resisting belt on Link-Belt idlers, at a rate of 260 ft. per minute, to the top of the all-steel crushing and screening plant.

The belt discharges directly to a 36x30 single roll primary crusher manufactured by the Jeffrey Manufacturing Co., Columbus, Ohio, and driven by a 50 hp. G. E. motor. This crusher reduces the size of

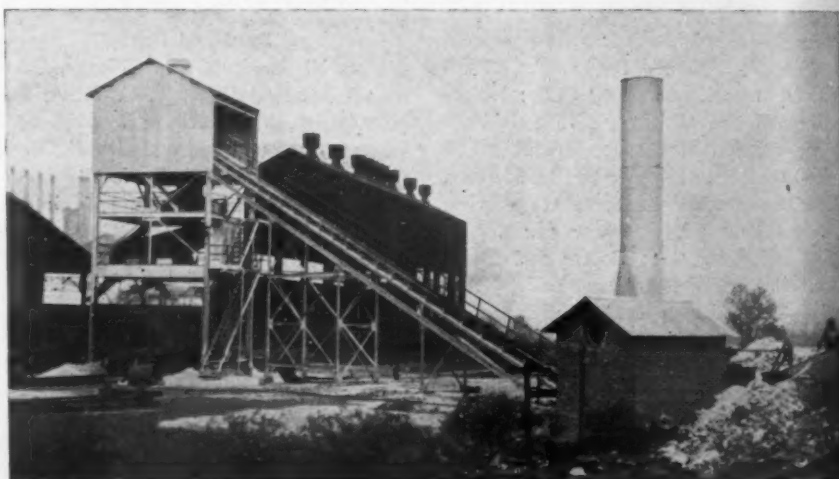
the Superock to 1½ in. minus. From the crusher, the "run of mill" material can be loaded directly into railroad cars through a 30 in. chute, or passed for further reduction to a 30x36 double roll Jeffrey reduction crusher. Sizing takes place over a 5x12 ft. Robins double deck screen, driven by a 10 hp. G. E. motor through a V-belt drive. All sizes of Superock pass directly through chutes to railroad cars below. Three men are required to operate the plant.

### Physical Properties

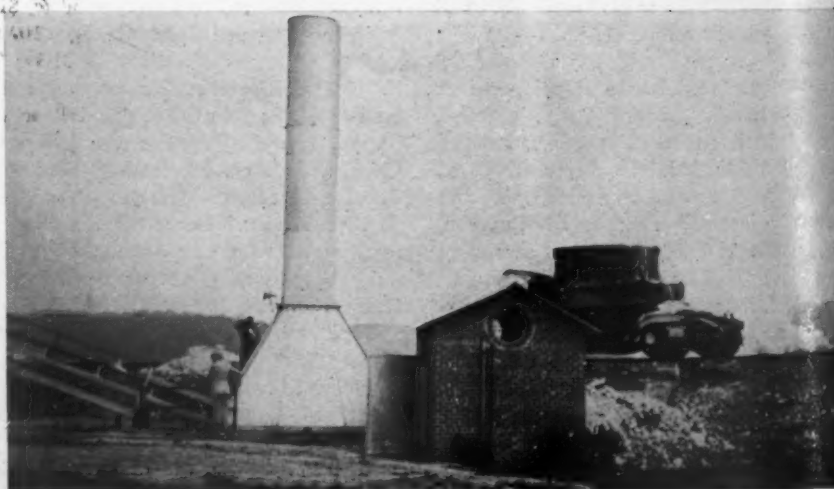
Under the microscope, Superock is found to be a mass of disconnected air

cells of various sizes, each separated by hard thin walls of slag. This cellularity of structure is said to continue down to the finest particles, as low as 200 mesh and finer. Because of this cellularity, concrete made from Superock has high sound-absorbing qualities, low absorption and low heat conductivity.

The fine size of Superock aggregate is the one used in the manufacture of concrete masonry units, and is said by the manufacturer to be readily used in any standard machine. The aggregate is light gray in color, and when used in masonry units gives a block weighing from 50-65% as much as an ordinary gravel concrete unit.



General view of Superock plant



A pot of molten slag being discharged into machine



SUPEROCK FINE (ACTUAL SIZE)



SUPEROCK COARSE (ACTUAL SIZE)

It is claimed that these Superrock units may be easily cut with ordinary carpenter's tools, thereby facilitating the cutting of chases and also openings in walls. Also, the holes can be drilled with an ordinary twist drill for bolts and lag screws, and units so made can be readily nailed without the use of nailing plugs.

Executives of the company claim that masonry units, when manufactured from Superrock aggregate, have a relative heat conductivity as low as 1.16. And as a consequence, buildings built of Superrock units should be warm and easy to heat in cold weather, and cool in hot weather. It is also claimed by the manufacturer that units made from this aggregate have extraordinarily great resistance to the high temperatures encountered in fires.

Besides being used for masonry units, the aggregate is used in the manufacture of pre-cast joists, floor and roof slabs, roofing tile, chimney blocks, septic tanks, drain tile, burial vaults, fence posts and poles, concrete pipe and in other concrete products. The aggregate is furnished in two standard sizes, fine and coarse. Besides being used as the "sand" in ordinary concrete, the fine aggregate is used for the manufacture of concrete products.

The fine size averages 1250 lb. in weight to the cu. yd., with an apparent specific gravity of 1.46, while the coarse aggregate averages 1000 lb. per cu. yd. and a specific gravity of 1.12.

The sieve analysis of fine Superrock ( $\frac{3}{8}$  in. to dust) is as follows:

Retained on No. 4.....	5.7%
Retained on No. 8.....	20.3
Retained on No. 16.....	34.3
Retained on No. 30.....	23.6
Retained on No. 50.....	9.5
Retained on No. 100.....	4.2
Passing No. 100.....	2.4
	<hr/> 100.0%

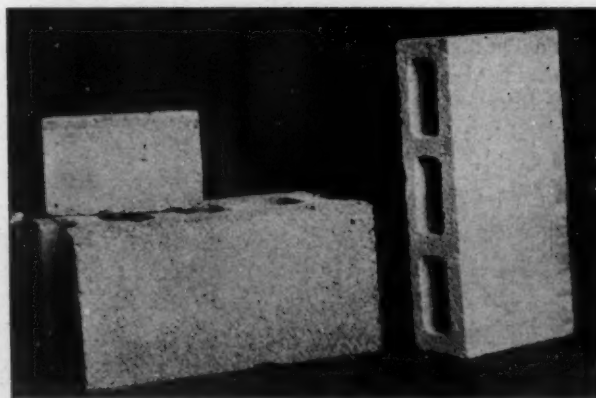
The sieve analysis for coarse Superrock is:

Retained on $\frac{3}{4}$ .....	16%
Retained on $\frac{1}{2}$ .....	39
Retained on $\frac{3}{8}$ .....	43
Passing $\frac{3}{8}$ .....	2
	<hr/> 100%

The fineness modulus of fine Superrock will average 3.60 and for the coarse size



Molten slag running into machine



Superrock concrete masonry units

is 7.69. Tests show that the average absorption of Superrock is 4% or less. Due to the ability of the rough surface of the particles to hold water, more free water is contained in a pile of Superrock than might be the case with regular aggregates, and in a thoroughly saturated condition the fine size retains as high as 18% surface moisture, and the coarse size retains about 5% for short periods.

The aggregate is absolutely dry when produced and is loaded directly into cars and is weighed immediately on the railroad track scales adjacent to the plant, insuring that moisture is not included when weighed. Coarse Superrock bulks so little with increases in surface moisture that no volume correction is necessary, but a correction is necessary in the fine size where bulking may amount to 35% at about 9% moisture.

#### Chemical Properties

Superrock has essentially the same chemical composition as the blast furnace slag from which it is made, except for a reduction in the content of sulphur, which takes place in the manufacturing process. The slag from which Superrock is manufactured contains four complex mixtures of rock forming minerals, as follows:

Akermanite $2\text{CaO} \cdot \text{MgO} \cdot 2\text{SiO}_2$ .....	18.45%
Anorthite $\text{CaO} \cdot \text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2$ .....	11.97
Calcium Bisilicate $\text{CaO} \cdot \text{SiO}_2$ .....	34.28
Gehlenite $2\text{CaO} \cdot \text{Al}_2\text{O}_3 \cdot \text{SiO}_2$ .....	32.90
	97.60%

In addition there is included .79% manganese oxide and 1.61% calcium sulphide.

CaO exists only in combination with the rock-forming minerals and not as free lime; while considerable of the low percentage of sulphur is liberated during the manufacturing process.

Besides being used for concrete products manufacture, Superrock is adaptable as an aggregate for nearly all types of concrete, with or without reinforcing. It is recommended by the manufacturer that the two sizes of Superrock be used as aggregate for concrete, where all the natural physical advantages such as nailability, high sound absorption, low heat conductivity, etc., are desired. Concrete made with Superrock as aggregate follows the water-cement ratio theory, and will reach a predetermined compressive strength for a given proportion of water per sack of cement.

It is claimed that only 36% of the heat transmitted through regular stone concrete would be transmitted when Superrock is substituted as an aggregate. When used for pouring reinforced concrete, the modulus of rupture is said to be higher than for concrete made with ordinary aggregates, and that the actual average bond strength is four to five times the strength allowed under the Joint Code. C. S. Robinson is president of the company, with offices in the Empire Building.

### Orders Piling Up

Federal-American Cement Tile Co., Birmingham, Ala., is completing orders for three jobs aggregating about \$100,000. The company is making the tile for the concrete cribbing or retaining wall for two of the grade crossing elimination projects at Thomas, representing an outlay of around \$5,000. The company has been furnishing cement tile roofing for the Naval Air Station at Pensacola on orders totaling between \$40,000 and \$50,000. Tile from the same company was used in reroofing the wire plant of Gulf States Steel Co. at Alabama City, costing around \$50,000.

### Business Growing

Central Pre-Mix Concrete Co., Spokane, Wash., reports business the first six months of 1936 is equal to the first 11 months of 1935. Many small order deliveries are being made direct to home owners. The company has added \$9000 worth of new equipment this year. W. M. Murphy is president of the company, and H. D. Sullivan is manager.

### Ordinance Does Not Apply

Ralph C. Condo, Plainfield, N. J., concrete products manufacturer, can't be stopped from operating his plant in the early morning hours on complaint of neighbors who alleged he was violating an anti-noise city ordinance. The council decided the ordinance was aimed at barking dogs and crowing cocks and not at noise incident to industry.

### Changes Ownership

Elmer Strong, La Crosse, Wis., has purchased the concrete block plant at 2300 South Ave. from the George Ebner estate and the plant is resuming production after a lapse of two years.

### New Equipment

W. J. Conrad & Sons, North Main St., Marysville, Ohio, have installed equipment in their concrete products plant to make the new "oscillated Strau-blox," which have machine-troweled faces, front and back. New Howe truck scales 9x30 ft. have also been installed.

### New Plant

Flintkote Co. has purchased land adjoining its Chicago Heights, Ill., asphalt roofing plant and will invest \$200,000 in a new building and equipment to make cement-asbestos shingles and siding.

### Fire Loss

Mishawaka Concrete Block Co., plant on Union Road, Mishawaka, Ind., was destroyed by fire July 5.

### New Ownership

Builders & Industrial Supplies, Inc., 4090 Detroit Ave., Toledo, Ohio, has been organized to take over the property of the former Builders & Industrial Supply Co. Edward E. Evans, former president and general manager of the Whitehouse Stone Co., is president of the new firm. O. C. Norton is treasurer, James A. Nicholson, secretary. The new organization will specialize in the production of ready-mixed concrete.

### New Plant

Earl W. Baker Utilities Co., Bethany, Okla., is completing a new reinforced-concrete pipe plant at Main and Hammond streets. The equipment was moved from a similar plant at Enid.

### Changes Ownership

Hatboro Concrete Products Co., Hatboro, Penn., has been purchased by Samuel Corson and is in production again.

### New Plant

Conroe Concrete Products Co., Emporium, Penn., has built a new plant at Woodland Ave. and Fourth St. Mr. Conroe, proprietor, was formerly associated with the Bradford Building Block Co.

### Fire Loss

Builders Concrete Stone Co., Pawtucket, R. I., was destroyed by fire in June. The plant had not been operated for some time.

### Demonstrate New Process

Gravel Products Corp., Tonawanda and Buffalo, N. Y., and Cleveland, Ohio, recently demonstrated at its Tonawanda concrete products plant the new Billner vacuum system of hardening concrete rapidly. Among those who witnessed demonstrations in the production of various concrete items with the vacuum system were more than 200 city, town, county, state and federal officials who are closely identified with the public works operations of their various connections. Dealers in building materials from the Tonawandas and many surrounding municipalities and leaders in the field of concrete development were among those present.

A dinner preceded the visit to the plant. The meal was served at the Delaware Hotel. Stewart S. Neff, district representative of the corporation, acted as toastmaster. Those who spoke included Duff Abrams and K. T. Billner, of New York, who have been prominently identified with the development of the vacuum process.

# New Machinery and Equipment

## Rubber Goods

**T**HE B. F. GOODRICH Co., Akron, Ohio, announces "Hipress" air hose, a new product for all types of pneumatic tool applications, made in three sizes, 1/2-in., 3/4-in. and 1-in., in 500-ft. lengths.



*Air hose for hard service*

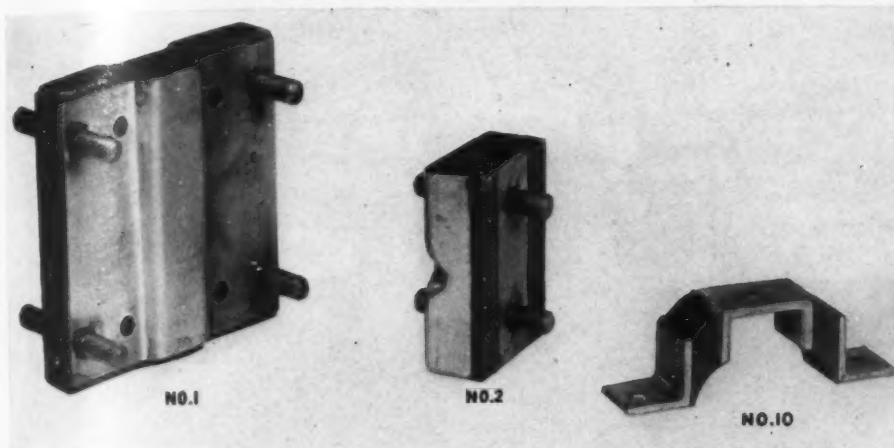
rubber is attached to the metal plates with a brass plating type of bond which gives an adhesion of 200 lb. per sq. in.

Vibro-Insulators are stocked in three types: No. 1 has a maximum load capacity of 800 lb. and a minimum frequency of 800 vibrations per min. No. 2 will support a maximum load of 200 lb. and has a minimum frequency of 1200 vibrations per minute. No. 10, which is of the double shear type, has a minimum frequency of 1000 vibrations per minute and is available in a range of sizes for loads of 50 to 3000 lb.

## Dust Control

**M**ARKLEY DUST CONTROL SYSTEM, INC., 415 Lexington Ave., New York City, is marketing portable apparatus for collecting dust from percussion rock drills. Dust from the drilling enters the control system through a metal hood capped with a flexible rubber gasket that fits around the drill steel, covering the drill hole. A double spring-steel flap on the side of the hood and a split in the rubber gasket permit the hood to be attached to, or disconnected from, the drill steel without removing the steel from the hole. This permits easy inspection of the hole, and changing of steel without interference from the hood. The flexible gasket aids in collaring the hole, and also permits drilling at an angle with the face of the rock.

From the hoods the dust-laden air is conducted through 1 1/2-in. hose to primary separator tanks, where it is claimed 98% of the dust is removed by a baffle arrangement. The steel shell of the tank is fastened to a separate bottom plate by means of a quick-acting toggle clamp with an air-tight rubber seal. A tough pasteboard container that fits snugly within the steel cylinder retains the coarse dust. When the container is full, the bottom clamp is released and the cylinder is lifted free of the carton. A pasteboard or metal cover effectively seals the container, permitting the dust to be removed from the



*Vibration damping rubber-to-metal mountings*

The inner carcass consists of four plies of specially woven duck. The outer carcass is a tight braid of high tensile cords, applied with a high tension. Between the inner and outer carcasses is a substantial insulation to serve as a secondary tube to seal off penetration of air, and to cushion blows from the outside.

The tube is made of a special rubber to resist both oil and heat. Not only is it claimed that this tube will last longer in air hose service where oil is present but that it will not break into loose particles and clog the tools. The rubber cover of hose is compounded to withstand abrasion and abuse.

## Vibration Insulators

The B. F. Goodrich Co. also announces a new standard line of vibration damping rubber-to-metal mountings, known as "Vibro-Insulators," which are designed for bases of machines, electric and combustion motors, generators, vibrating screens and reciprocating mechanisms.

These mountings are of the shear type, consisting of a highly age-resisting rubber bonded to two metal plates, one of which is fastened to the vibrating member and the other to the support or foundation. The



*Portable dust control system for percussion rock drills*

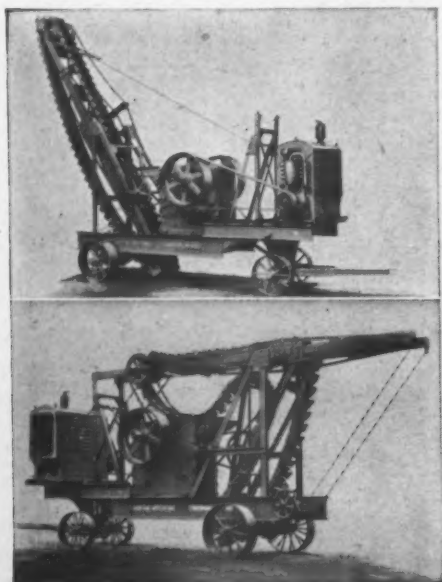
job without spilling or exposure. The containers may be changed without shutting down the system. With reasonable care the cartons may be used several times.

From the primary separator the air stream is conducted through another hose to the secondary separator, which contains a bag filter. This separator is equipped with a shallow pasteboard carton, which may be removed and sealed the same as the larger containers in the primary tanks. Experience has shown that this container needs to be changed only once a week in normal drilling operations. An external shaker bar frees the dust within the filter at desired intervals.

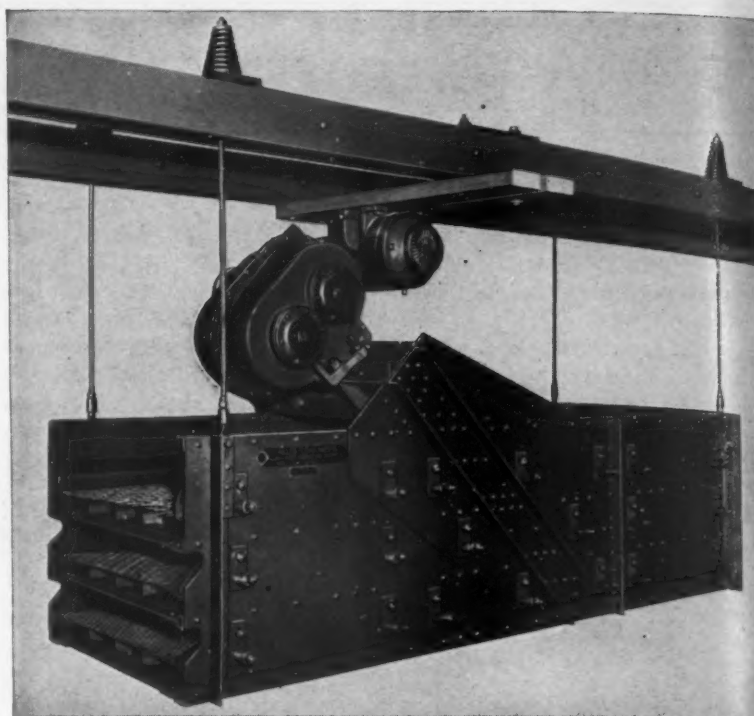
Power for operating the system is supplied by a rotary vacuum producer, belt-driven by a 1½-hp. engine. If desired, a small air motor or universal electric motor can be used in place of the gas engine. From the secondary separator hygienically safe air passes through the vacuum producer into the atmosphere, discharged through a silencer. A vacuum relief valve, installed on the secondary separator, assures constant speed of the vacuum producer, thus maintaining a constant velocity of the air stream which prevents clogging of the air lines. The power assembly is mounted on wheelbarrow skids for easy handling.

### Portable Crushing Plants

AUSTIN-WESTERN ROAD MACHINERY CO., Aurora, Ill., announces a new line of small portable crushing plants. Each unit of this line, known as the C.E.P., consists of a crusher, a folding elevator, and a motor, all mounted on a steel tired truck. The crushers consist of eight sizes, with jaw openings of 9x16 in., 9x20, 12x20, 15x20, 4x40, 9x40, 18x38 in. and a roll crusher for crushing sized stone with 30-in. rolls having a diameter of 18 in. Waukesha motors of suitable horsepower are used for power, and the power take-off is by a V-belt drive.



Small portable crushing plants



New "low-head" vibrating screen

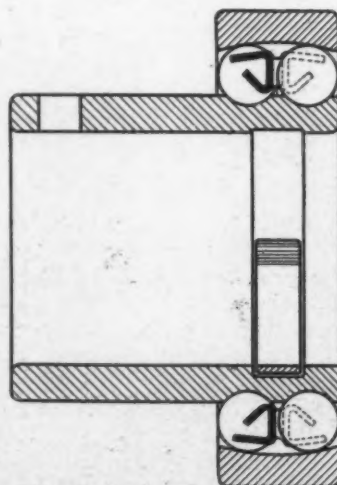
### Extends Line

ALLIS-CHALMERS MANUFACTURING CO., Milwaukee, Wis., announces that it has extended its new line of "Low-Head" vibrating screens in single-, double- and triple-deck designs up to and including 6 ft. wide.

### Bearing Lock

SKF INDUSTRIES, INC., Front and Erie Sts., Philadelphia, Penn., announces the "grip-lock" bearing. The principle employed offers, it is claimed, the advantage of quick,

machined in the bore of the inner race. Fitted in the eccentric groove is a piece of spring steel known as the grip-lock shoe. When the shoe is in the deepest part of the eccentric groove the bearing may be readily slipped on the shaft. Then, by holding the inner race of the bearing while the shaft turns in the direction of operation, the knurling at the ends of the grip-lock shoe grips the shaft causing the shoe to wedge in the shallow part of the eccentric groove, thus locking the bearing on the shaft.



Bearing with grip-lock shoe

simple application of the bearing without tools of any kind and insures the user of a bearing positively locked to the shaft.

Essentially, the bearing is the conventional, well-known SKF self-aligning extended inner race bearing with an eccentric groove

### New Type Cleats

BUCYRUS-ERIE Co., South Milwaukee, Wis., recently introduced a new cast cleat to be attached to the links of the company's cats on jobs where increased traction is desired. A cross-construction provides a two-way traction that prevents slipping when moving forward and eliminates sliding sidewise when on soft hillsides. The cleats may be used on every link, or every second, third, or fourth link, depending on the ground requirements. They are attached by the curved ends of the two sections hooking over the outside edges of the links,



Cleat providing two-way traction

and the two parts are bolted together. They are removed by merely unbolting and lifting from links. Sizes are available to fit many of the smaller Bucyrus-Erie machines.

### New Shovel Control

**L**INK-BELT CO., Chicago, Ill., announces what it terms a revolutionary development in the operation of shovels, cranes and draglines.

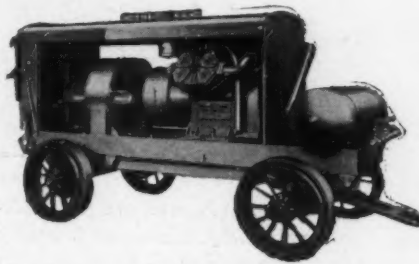
It is a power control, with short, easy-throw levers; to be known as "Speed-O-Matic" control. The advantages claimed for it are (1) elimination of operator fatigue; (2) much speedier operation; (3) greater output.

The character of the mechanism is not disclosed but the accompanying illustration shows in a general way how the usual normally-operated levers, which require strong arms, have been replaced with throttles.

The Speed-O-Matic control is referred to as having no wearing parts between the clutches or brakes, and the conveniently arranged control stand behind which the operator is comfortably seated, at front of cab. Even the foot pedals are operated from this seated position. The large truck type seat is adjustable both as to height and proximity to control stand.

As to maintenance costs, it is claimed that a Speed-O-Matic machine working alongside of an exactly similar machine on levee building service for a whole year, has shown that the clutch and brake wear is so nearly negligible on the faster Speed-O-Matic controlled unit that it is believed that deterioration of material, rather than wear, will determine the life of clutch and brake linings.

The new control is now furnished as standard equipment on Link-Belt shovel-dragline crane models K-40, K-45, K-48 and K-480.



Two-stage electric portable compressor

### Air-Cooled Portable Compressor

**I**NGERSOLL-RAND CO., Phillipsburg, N. J., announces two-stage electric portable compressors driven by either a.c. or d.c.

motors. Starting equipment is of the magnetic type to operate from a push button. Five models, from 15- to 75-hp. and numerous types of mountings are available.

### New Shovel, 1 1/2 Yd.

**H**ARNISCHFEGER CORP., Milwaukee, Wis., recently announced the second in its new 700 series, Diesel-engine-powered excavators, known as Model 705, a full revolving machine of 1 1/2-cu. yd. capacity. Standard power is by a 6-cylinder Caterpillar Diesel engine rated at 130 hp. at 900 r.p.m., although gasoline power is also available. The model 705 is fully convertible for service as shovel, dragline, crane, trench hoe, skimmer or pile driver.



Convertible, Diesel-powered shovel



Hooded shovel providing easy operating control

### Quarry Skips

**D**EMPSTER BROTHERS, INC., Knoxville, Tenn., supplied the two interesting views on this page to illustrate a recent quarry installation for hand loading, but mechanical haulage and dumping. Such installations are desirable in certain lime operations, or others where hand-picked stone is necessary, and on PWA contracts where hand loading may be necessary to employ the required number of men. The pictures are practically self-explanatory. One truck can handle any number of buckets, depending on how fast they are loaded. The dumping device is claimed to be designed so that it is impossible to hoist the bucket too far or to drop it quickly, endangering the lives of workmen. When the bucket has reached sufficient height, the oil in hydraulic cylinder automatically by-passes. No brakes or clutches are necessary. The bucket is dumped by engaging two hooks provided for this purpose, which automatically drop into neutral position when the bucket is hoisted

*Quarry skip adapted for installations using hand loading but mechanical haulage and dumping*



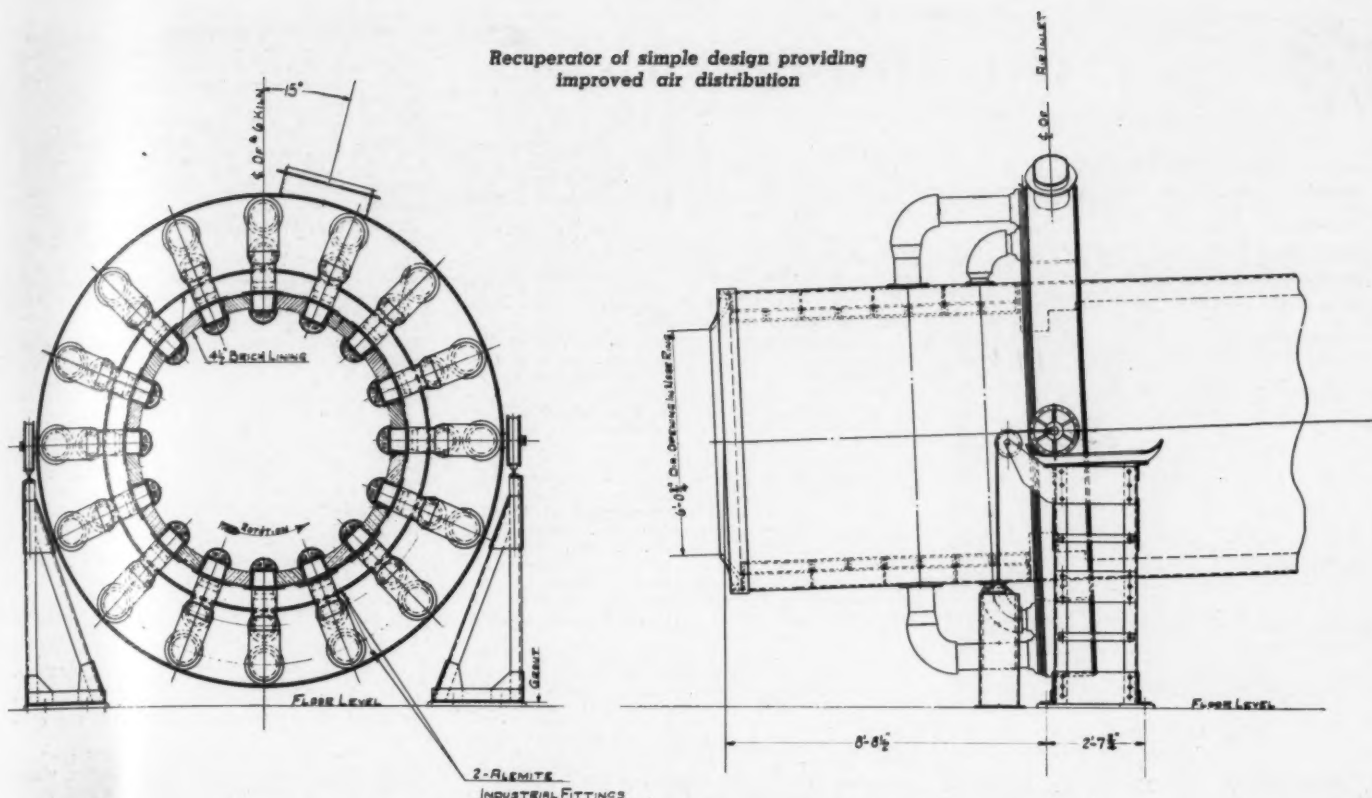
after being dumped. A semi-automatic, direct by-pass valve is provided for lowering the bucket to the ground, if desired. This valve is actuated by a lever at the driver's

seat, and closed by spring action. No assistance is needed from outside help in completing the cycle after the detachable bucket is hooked to the dump.



*New type quarry skips in use at Williams Lime Manufacturing Co., Knoxville, Tenn.*

Recuperator of simple design providing improved air distribution



### New Type Heat Saver

**M**ANITOWOC ENGINEERING WORKS, Manitowoc, Wis., announces a new type of the Vanderwerp recuperator, designed primarily for application to cement kilns. While not differing basically from previous designs, as a result of experience gained in long service, certain refinements in detail have been incorporated and greater flexibility provided to meet any operating requirement, particularly in the matter of air distribution. Another important feature consists in the introduction of the short liner plate, having a nominal weight of but 32 lb., which plate, in effect, floats on its supporting subframe and is air-cooled.

Operating results from recuperators employing this plate are claimed to be highly satisfactory, and to indicate that nothing further is desired in this direction. Due to the simplicity of the recuperator, which has but one moving part, maintenance is said to be practically confined to the occasional replacement of front-row liner plates, where maximum clinker temperatures are encountered. The earlier design of this plate has been superseded by this later design, assuring that maintenance costs will be still further reduced.

Two of these new Type CI recuperators have been installed by the Medusa Portland Cement Co., at Wampum, Penn., making a total of four units in this plant. A duplicate unit is also under construction for Dewey Portland Cement Co., Dewey, Okla.

### Reopen Quarry

Colorado Fuel and Iron Co., Pueblo, Colo., has reopened its limestone quarry at Salida.

### Belt Lacing

**F**LEXIBLE STEEL LACING Co., 4607 Lexington St., Chicago, Ill., announces special lengths of "Alligator," steel, belt lacing. The nine larger sizes from Nos. 15 to 75 are listed in lengths from 14 in. to 96 in. The lacing is packed complete with hinge pins and handle gauge pin. The familiar sectional rocker hinge pin is supplied for power transmission installations, but a one-piece corrugated hinge pin is used on conveyor belts. As in the standard boxes, the special lengths are also available in "Monel metal" and non-sparking and non-magnetic alloys.

### Develops New Truck

**American Stone Corp.**, Lima, Ohio, has recently purchased a fleet of Ford 1936 model V-8 trucks for delivery service. To the V-8 chassis the company had a third axle added, made by the Acme Six Wheeler Co. This consists of a massive tubular axle, oversize Timken bearings, large tubular cross-shaft. Bendix 16-in. x 2½-in. brakes in cast drums, steel-bushed spring chairs, frame extension channels extending under the cab, fish plates over the cross-shaft, and matched steel spring leaves for the heavy loads. The normal limit of a regular Ford dump truck is 4 tons, or slightly over, but with this third axle and accessory equipment it has been possible to double the capacity to between 8 and 9 tons.

For the body and hoists the American Stone Corp. specified Wood hydraulic, made by the Gar Wood Industries, Inc. Among the principal features are a heavy-duty roller bearing oil pump, bronze

gears, three-way control valve, permitting spreading the materials while the truck is moving forward or backward, cylinder of special wrought steel, reamed and rolled, piston rods of solid steel, and piston heads provided with four piston rings to prevent the body from settling when elevated.

Willis R. France is president of the American Stone Corp., and F. Dan Haselmire vice-president. Together they have developed an entirely new unit in truck transportation.

### Adds Crusher

**Missouri Portland Cement Co.**, Memphis, Tenn., sand and gravel plant recently added a 32-B Tel-smith reduction crusher. This and other plants in the district are said to be very busy.

### New Development

**Edward Elliott** has opened up a new feldspar deposit near Rutherfordton, N. C., said to have 500,000 tons in sight. Mining operations have begun.

### Moves Bag Plant

**United States Gypsum Co.**, Chicago, Ill., has removed its paper bag plant from Genoa, Ohio, to Oakmont, Penn., to have a more central distributing point.

### Road Builders' Convention

**American Road Builders' Association**, Washington, D. C., has selected New Orleans, La., and the week of January 11, 1937, as the place and time of the next convention and exhibit.



## THE INDUSTRY

### New Incorporations

**American Diatomite Corp.**, Clermont, Fla. Incorporators are W. A. Chenoweth and H. C. Brown.

**Keystone Lime Corp.**, Kings, N. Y.; building materials; 200 shares, no par value. David B. Gets, 80 Wall St., New York, N. Y.

**Greenville Concrete Co.**, Greenville, S. C.; general contracting and building; \$5000. Incorporators are John C. Caldwell and J. Roy Pennell.

**Keefner Sand & Gravel Co.**, Des Moines, Iowa; capital stock, \$10,000. Incorporators are John F. Keefner and Katherine K. Melvin.

**The Art Build-Up Stone Co.**, Cincinnati, Ohio; 100 shares, no par value. Incorporators are John H. Seubert, Peter Klein and Jacob W. Hornert.

**Idaho Travertine Lime Co., Inc.**, Boise, Idaho; mineral mining and dealing in mineral food and fertilizers; capital stock, \$25,000—25,000 shares of \$1 each.

**Hartfield Gravel Co.**, Komensky, Wis.; 500 shares at \$100 each. Incorporators are G. E. Fugina, Elmer Barlow and Anna Schneider. Agent, Barlow & Fugina, Arcadia, Wis.

**Baker Mountain Corp.**, Farmville, Va.; to produce and sell kyanite and other minerals; maximum capital, 1000 shares, no par value; George Blow, president, New York, N. Y.

**Diamond Rock Asphalt Corp.**, Wilmington, Del.; to deal in rock asphalt, shingles, paving materials; \$16,500. Incorporators are C. S. Peabbles, L. H. Herman and Walter Lenz.

**Kankakee Stone Co.**, 769 S. Poplar Ave., Kankakee, Ill.; to deal in limestone in all forms; 100 shares, no par value common. Incorporators are Walter Scott, Eleanor Scott and G. A. Brown.

**Queens Sand and Gravel Corp.**, Flushing, N. Y.; sand and gravel and builders' supplies; \$2000. Incorporators are John A. Murray, Jr., and Franklin F. Regan, Flushing; and Mildred Barr, Jackson Heights.

**The West Memphis Concrete Products Co.**, West Memphis, Ark.; 250 shares par value \$100. Incorporators are W. G. Parker and William H. Hundhausen, both of West Memphis, and L. H. Conley, Jr., of Memphis, Tenn.

**Wake Forest Granite Co.**, Wake Forest, N. C.; to operate quarries and gravel pits; capital, \$10,000. Incorporators are Thomas Wakeham, Henderson, N. C., Leo J. Kuhl, Mount Airy, N. C., and Z. B. Williams, Wake Forest.

**Dudley Stone Products Corp.**, Dudley, Wis.; to deal in granite and stone; 3000 shares, no par value. Incorporators are Walter E. and Richard F. Dudley and Myron Stevens, Bagley, Wis.

**Acme Stone Co., Inc.**, R. F. D., Bloomington, Ind.; to deal in limestone and by-products; 1500 shares, no par value. Incorporators are William B. Hoadley, J. Mason Hoadley and Albert T. Hoadley, 1125 East Atwater Ave., Bloomington.

**Fagan Stone Co., Inc.**, South Walnut St., Bloomington, Ind.; to operate limestone and other building stone quarries; 500 shares, no par value. Incorporators are Samuel G. Fagan, 609 East Third St., Bloomington; Howard S. Fagan; and George W. Henley.

### Personals

**E. V. Daveler** has been elected a director of International Cement Corp., New York, N. Y., succeeding W. F. Carey, who resigned.

**W. W. Fischer**, president of Fischer Lime & Cement Co., Memphis, Tenn., sailed for Europe on the "Bremen" July 1 for a two-months' vacation.

**Frank Town**, Manitowoc, Wis., safety director of the Manitowoc Portland Cement Co., was elected president of the Wisconsin Council of Safety at its annual convention June 30.

**F. S. Rapp** of International Cement Corp., New York, N. Y., was elected a director of the New York City Control of the Controllers Institute of America for the fiscal year beginning September 1.

**George Killian**, newly appointed assistant to the president, Pennsylvania-Dixie Cement Corp., New York, N. Y., was recently appointed to the advisory board of the School of Credit Science at Pace Institute.

**Blaine S. Smith** and his family sailed on the "Manhattan" the middle of July for a six-weeks' vacation in Europe. Mr. Smith is resigning the presidency of Pennsylvania-Dixie Cement Corp. to become president of Universal Atlas Cement Corp., Chicago, Ill., September 1.

**Dr. Ozni Porter Hood**, chief of the technologic branch and chief engineer of the mechanical division of the United States Bureau of Mines, retired June 30, after 25 years of service with the Bureau. A farewell luncheon in his honor at Hotel Harrington, Washington, D. C., on June 27 was attended by more than 100 of his associates and former associates.

**Ambrose B. Underwood**, formerly pilot for Oliver King Sand & Lime Co., is pilot of the George J. Oehler steamboat of the Knoxville Sand and Gravel Material Co., Knoxville, Tenn., succeeding Capt. Robert Covington, deceased.

**A. E. Legg**, superintendent of the Pennsylvania-Dixie Cement Corp., Richard City, Tenn., was elected to head a new organization to conserve the wild life of Marion county, Tenn. **Tate O'Connor**, also of the cement force, was made secretary-treasurer.

**Edward J. Maguire** was honored at a banquet at Hotel Cleveland, Cleveland, Ohio, on July 13, when he completed 40 years of service with the Medusa Portland Cement Co. About 125 officials and employees of the company paid tribute to his rise from a secretaryship to executive vice-president and treasurer. He was presented with an automobile.

### Obituaries

**John Ransford Davis**, 42, Winnetka, Ill., assistant to the executive vice-president of the United States Gypsum Co., died July 4.

**Christian Paulsen Berg**, Chicago, Ill., one of the pioneers in scientific shop management, and efficiency engineer in the employ of Link-Belt Co. since 1932, died July 4.

**A. H. Whisman**, 54, president of Knoxville Crushed Stone Co., Knoxville, Tenn., died June 10 after a two-months' illness. He was also in the contracting business in Knoxville for 25 years.

**William W. Jones**, 80, retired New York State Chief Inspector of Mines and Tunnels, succumbed to the heat July 13. He was widely known as a slate expert and had operated his own quarry early in the century.

**Raymond John Elledge**, 51, superintendent of the Lone Star Cement Co., Kansas, plant at Bonner Springs, Kan., for the past year, died June 27 in Kansas City, Mo., following two major operations. He had been with the company for thirty years, at one time representing it in Cuba and South America.

**Capt. Robert Covington**, for 14 years pilot of the George J. Oehler steamboat, which tows sand and gravel barges for the Knoxville Sand and Gravel Material Co., Knoxville, Tenn., fell dead at the wheel June 16. He was 52, and had operated a crane for the company before he was licensed to pilot the steamboat.

**Claude H. Cubbins**, 80, former member of Cubbins Brick Co. and of Cubbins Lime and Cement Co., Memphis, Tenn., died June 16. He had engaged, together with his brother, in the business started by their father until the former's death in 1915. He then was in the contracting business until 8 years ago, when he retired.

### Quarries

**Palmyra, Mo.**: County highway department recently purchased a portable crushing plant.

**Chilton, Wis.**: City authorities have purchased a second-hand portable crushing plant.

**Athens, Tenn.**: County road department has opened a new quarry—making the fourth in operation.

**Gaines Bros.**, Cedar Rapids, Iowa, have leased the Williams quarry north of Vinton on highway 101.

**Cartersville, Ga.**: The city recently was planning to buy a rock crusher for use in paving projects.

**Superior, Wis.**: The city is opening a WPA rock crushing project 12 miles south of the city on county trunk A.

**L. W. Silven Construction Co.**, Osage City, Kan., is opening a quarry on the Filmore farm nine miles south of town.

**Warren T. Richards**, Wabash, Neb., has opened a quarry on his lands east of town, to produce material for river work.

**Nashville, Tenn.**: WPA recently began operation of a quarry to supply crushed stone for the local airport runways.

**Fort Scott, Kan.**: The country is opening a WPA quarry one mile south and one mile east of West Liberty church for road stone.

**Lincoln, Neb.**: The city purchased a rock crusher July 20 for the paving repair department. The price was \$1250 plus trade-in of old machine.

**Bert Metzger**, Ozawie, Kan., has installed a rock crusher on the A. V. DeGraw farm east of Holton, to produce material for Jackson county roads.

**Higbee, Mo.**: The Higbee Special Road District purchased a rock crusher early in July for placement on the Coons farm south of town, to produce road material.

**CONSIDER THE PATTERN**

Size, shape and arrangement of holes determine the effectiveness of Perforated Metal. The large stock of dyes, in GOOD CONDITION in the Wickwire Spencer Clinton Mill, enables their engineers to recommend what pattern is best for you without excessive cost. Request suggestions or write for a representative to call.

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**WICKWIRE SPENCER STEEL CO.**

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Buffalo Worcester Chicago San Francisco

**WICKWIRE SPENCER**  
perforated metals

**South Bend, Wash.:** County commissioners have put a new rock crusher and quarry into operation at Nallpee to provide rock for highways at the east end of Pacific county.

**H. R. Richardson, Vienna township, Marshall county, Iowa,** has established a quarry between Green Mountain and Garwin for supplying agricultural limestone to local farms.

**Orting, Wash.:** On July 1, WPA took over operation of the rock quarry east of town, which was down the latter part of June because of a slide which smashed the steam shovel. A new shovel has been installed.

**Hutchinson, Kan.:** About 22,000 tons of rock obtained from a ledge 8 miles north of town will be used in a big municipal sewage disposal plant now under construction. A crusher will be located at the quarry and the crushed stone hauled to the building site in trucks.

## Sand and Gravel

**Grundy Center, Iowa:** County supervisors have opened up a new gravel pit on the John Pabst farm.

**Acme Sand and Gravel Co., Spokane, Wash.,** recently put a new truck, which has a dump body, into operation.

**Marion Sand and Gravel Co., Richwood, Ohio,** began operating July 6 with orders sufficient to continue for a number of weeks.

**Oklahoma City, Okla.:** State highway commission is leasing four sections of state school land in Cimarron county for sand and gravel pits.

## Cement

**Consolidated Cement Corp., Fredonia, Kan.,** plant lost its big steam shovel in a fire June 28 in which damages amounted to several thousand dollars.

## Miscellaneous

**The Standard Silicate Co., Jersey City, N. J.,** recently purchased a vacant plot 50x90, adjoining its plant, at the northwest corner of Tonnele Ave. and Thorne St.

**Calrock Asphalt Co., Santa Cruz, Calif.,** shipped 200 tons of crushed rock asphalt July 6 to Salem, Ore., where it will be used on city streets. On the same day it also shipped 30 tons to the Sierra Pacific Power Co., Reno, Nev.

## Manufacturers

**Four Wheel Drive Auto Co., Clintonville, Wis.,** has appointed Chester J. Roberts as manager of the Milwaukee, Wis., branch.

**Independent Pneumatic Tool Co., Chicago, Ill.,** has appointed Harry Schultz as manager of contractor tool sales for the entire country.

**Stephens-Adamson Mfg. Co., Aurora, Ill.,** has appointed F. E. Dunlap as branch manager in charge of conveyor sales and engineering in Michigan, with offices in the Book Tower, Detroit.

**The Patterson Foundry & Machine Co., East Liverpool, Ohio,** has purchased the ball or mushroom grinder and mixer business of the A. & F. Brown Co. of New York.

**General Refractories Co., Philadelphia, Penn.,** recently moved its general offices into new quarters in the Real Estate Trust Bldg. at Broad and Chestnut Sts., Philadelphia.

**Newark Wire Cloth Co., Newark, N. J.,** announces appointment of Carl J. Eberly as its representative in the Detroit area. Mr. Eberly's headquarters are 2-251 General Motors Bldg., Detroit, Mich.

**R. G. Le Tourneau, Inc., Peoria, Ill.,** is making its third plant enlargement in little more than a year. An addition to the Peoria factory is being built to more than double present size and capacity.

**American Hoist & Derrick Co., St. Paul, Minn.,** announces appointment of J. L. Praytor, district manager, as representative in the south and southeastern section of the country. His address is 4601 First Ave. No., Birmingham, Ala.

**Westinghouse Electric and Manufacturing Co., East Pittsburgh, Penn.,** has appointed M. W. Smith as manager of engineering. He has been with the company since 1915. H. C. McElhone has been appointed assistant to vice-president.

**Lincoln Electric Co., Cleveland, Ohio,** announces appointment of the Intermountain Belting and Packing Co., Denver, Colo., as its agent in Colorado and parts of Kansas, Nebraska and Wyoming.

**Waukesha Motor Co., Waukesha, Wis.,** has appointed M. E. Nicklin as export manager, a new position growing out of the export division, which he has directed for several years. Mr. Nicklin sailed for Europe July 3 to survey foreign markets.

**Imperial Electric Co., Akron, Ohio,** recently appointed George M. Snodgrass as general sales manager. Mr. Snodgrass was with Fairbanks-Morse & Co., Chicago, Ill., for the last 15 years, where he advanced to the position of general sales manager of the electrical division.

**Schenectady, (N. Y.) Chamber of Commerce** sponsored a celebration in honor of its city's Half Century of Electrical Progress June 12 and 13. Thomas Alva Edison started the Edison Machine Works fifty years ago, laying the foundation for a local industry which later developed into the present General Electric Co.

**Leeds & Northrup Co., Philadelphia, Penn.,** announces that its president, M. E. Leeds has received the Gantt Medal from the Institute of Management for "distinguished achievement in industrial management as a service to the community." The Polytechnic Institute of Brooklyn has also made him Doctor of Engineering "in recognition of great service to society."

**Koehring Co., Milwaukee, Wis.,** has appointed the Arizona Lumber Co., 9th and Jefferson St., Phoenix, Ariz., as distributor in Arizona. The Dallas territory is being handled by the Leland Equipment Co. of Texas, 3918 Main St., Dallas, Texas. Mr. Burrows, formerly of Clark & Burrows, remains active in Dallas also. Roanoke Tractor and Equipment Co., 405 Center Ave., N. W., Roanoke, Va., is serving the Virginia territory, with W. H. McIlhenny as sales manager.

**Worthington Pump and Machinery Corp., Harrison, N. J.,** gave a testimonial luncheon in Newark, July 8, in honor of Harry T. Smith, traffic manager, upon his completion of 50 years of continuous service with the company. Edwin J. Schwanhauser, manager of Worthington's Buffalo, N. Y., works, has been elected president of the Buffalo Chamber of Commerce. William H. Phillips, recently with Harry Pratt Co. of Chicago, has joined the Worthington organization as power plant specialist, with headquarters in the Chicago office.

## Trade Literature

The following literature is obtainable on request to the respective sponsor.

**Steel Service.** A 4½x8½-in. general data book, "Ryerson Steel-Service, Section 5," 192 pages, gives A.S.T.M. specifications, allowable loads and properties of beams, conversion tables, electrical resistance, nickel alloys, weight formulas and a great deal of other information on tool and alloy steels. JOSEPH T. RYERSON & SON, INC., Chicago, Ill.

**"Asphalt—Nature's Most Versatile Product"** by J. E. Pennybacker is a 24-page essay on the history and application of asphalt. The book has highly attractive woodcut-like illustrations. THE ASPHALT INSTITUTE, New York, N. Y.

**Tires.** The 1936 edition of the "Operators' Handbook" packs into 66 small pages detailed data and specifications on tires and tire performance. Cost calculation and "Why Tires Fail" are also discussed. THE B. F. GOODRICH CO., Akron, Ohio.

## HAISS LOADERS



## Have What It Takes

As a customer says, "They sure got the guts in 'em." And that goes for all the heavy duty sizes—5, 3 or 2 yds. a minute . . . Manganese chain and feeding propellers, Hais loader-type transmission—no wonder they're most economical to own.

Write, Wire or Telephone

## HAISS

George Hais Mfg. Co., Inc., Park Ave. & 143rd St., New York

Who, for over 40 years, have created and sold none but equipment of demonstrable superiority in design and manufacture. Clamshell Buckets — Portable Conveyors



## QUARRY CARS



## Save their cost

You cannot profitably keep pace with increased business and use obsolete, time- and profit-consuming quarry cars.

KOPPEL QUARRY CARS are sturdy, efficient, modern cars designed for years of gruelling quarry service with minimum wear and maintenance expense. Anti-friction bearings offer an added saving.

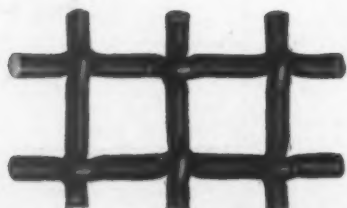
Replace those obsolete relics with dividend-earning KOPPEL CARS of types and capacities best suited to your needs. Our engineers will be pleased to guide you in your selection.

Write for Bulletin 70 NOW!

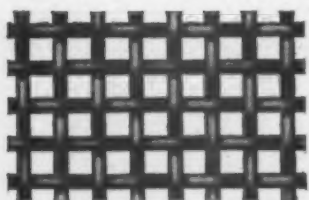
## KOPPEL INDUSTRIAL CAR & EQUIPMENT CO. KOPPEL, PA.

Branch offices: New York Pittsburgh Chicago

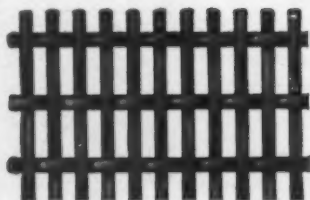
# IS YOUR SCREEN PROBLEM A TOUGH NUT TO CRACK?



"HY-LO" Crimp Wire Screen



Square Mesh Wire Screen



Oblong Mesh Wire Screen

Efficiency? Resistance to vibration? Resistance to abrasion? What is your wire screen problem? We would like to help you lick it.

We offer you the benefit of 90 years of experience in making wire to withstand tough service conditions . . . the benefit of over a half century's experience in wire fabric production.

Roebbling Wire Screens are available in many types and metals to meet a wide range of efficiency, vibration, and abrasion requirements.

JOHN A. ROEBLING'S SONS COMPANY  
TRENTON, N. J. Branches in Principal Cities

## ROEBLING *Wire Screen*



90 YEARS OF WIRE MAKING SPELLS THE DIFFERENCE

*Built for Heavy Service*  
**FULL SIZED**  
**CORRECT WEIGHT**  
**PLENTY OF POWER**  
*and with all*  
**NORTHWEST**  
**ADVANTAGES**



• In building the Northwest Model 15, 3/8 Yd. and Model 18, 1/2 Yd. Shovels, Cranes and Draglines, Northwest engineers designed them with the work they must perform definitely in mind—they have been built up to a job not down to a price—yet their cost is within the reach of every contractor.

These Northwests bring you a combination of features found on no other machine of the same capacities. The "feather-touch" control, the Cushion Clutch, Northwest Welded Boom and Stick, Cast Bases, a Manganese Front Dipper and the Northwest Independent Crowd are all standard equipment at no extra cost.

Before buying a machine of 3/8 or 1/2 yd. capacity be sure and get full details on Models 15 and 18. A catalog on request.

**NORTHWEST  
ENGINEERING  
COMPANY**

1702 Steger Building  
 28 East Jackson Boulevard  
 Chicago, Illinois, U. S. A.

BUILT IN A RANGE OF 15 SIZES  
**NORTHWEST**  
 3/8 YARD CAPACITY AND LARGER



# STREAMLINED

for **HIGHER  
SPEED and  
LONGER LIFE**



The Timken Rock Bit is the only streamlined removable bit. There is no projection or overhang where bit and steel meet. The joint is so smooth as to be almost invisible. This streamlined effect is made possible by the Timken shoulder construction as shown in the sectional illustration. It plays an important part in the superior performance and longer life of Timken Bits.

By permitting the hammer blows to be transmitted directly to the body of the bit instead of through the threads, it makes possible an even distribution of the driving force. This produces considerable increase in drilling speed. The end of the steel does not bottom in the bit, and thus the threads are protected from injury by the impact of the hammer blows. Result, longer life.

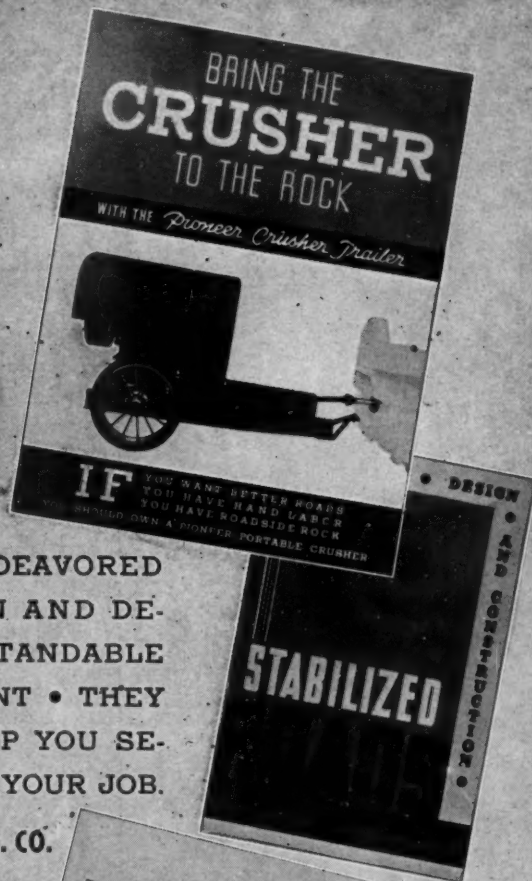
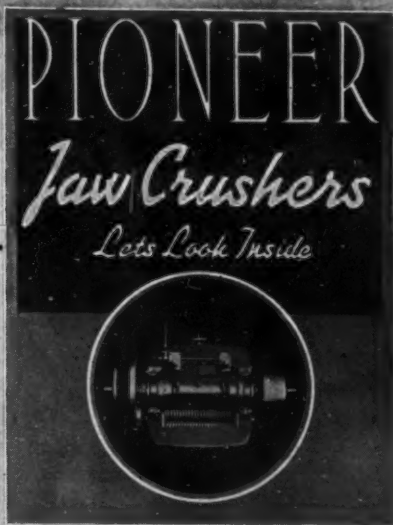
Furthermore, Timken streamlining enables the bit to be withdrawn easily and quickly after drilling because there is no obstruction for chips to lodge behind and wedge the steel in the hole.

Streamlining is one of the many good reasons why Timken Bits perform better — and are worth more. It will pay you to use them.

Complete Stocks Maintained in Principal Distributing Centers

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

# TIMKEN BITS

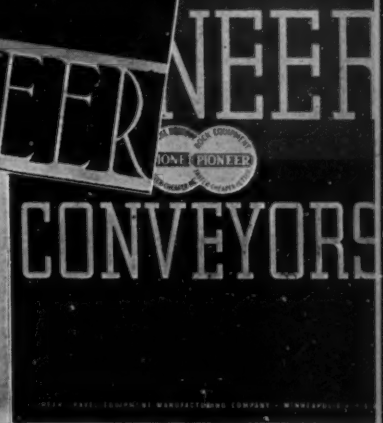
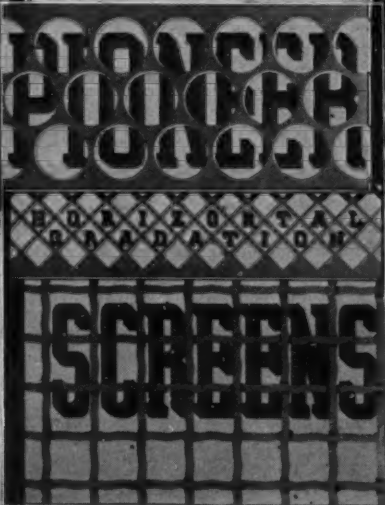


IN THESE FOLDERS, WE HAVE ENDEAVORED TO PRESENT, BY ILLUSTRATION AND DESCRIPTION, A TRUE AND UNDERSTANDABLE PICTURE OF PIONEER EQUIPMENT • THEY ARE WRITTEN FOR YOU—TO HELP YOU SELECT THE RIGHT EQUIPMENT FOR YOUR JOB.

PIONEER GRAVEL EQUIPMENT MFG. CO.

1515 CENTRAL AVENUE

MINNEAPOLIS, MINNESOTA



# Classified Directory of Advertisers in this Issue of ROCK PRODUCTS

For alphabetical index, see page 2

**Agitators, Thickeners and Slurry Mixers**  
Dorr Co.  
Manitowoc Engr. Works  
F. L. Smidth & Co.

**Airveyor**  
Fuller Co.

**Air Compressors**  
Chicago Pneumatic Tool Co.  
Fuller Co.  
Ingersoll-Rand Co.  
Nordberg Mfg. Co.  
F. L. Smidth & Co.  
Traylor Eng. & Mfg. Co.

**Air Filters**  
Fuller Co.

**Air Separators**  
Bradley Pulverizer Co.  
Raymond Bros. Impact Pulv. Co.  
W. W. Sly Mfg. Co.  
Sturtevant Mill Co.

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Stulz-Sickles Co.

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Richardson Scale Co.

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Joseph T. Ryerson & Son, Inc.

**Backfillers**  
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Harnischfeger Corp.

**Bagging Machinery**  
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**Balls, Grinding, (See Grinding Balls)**

**Balls (Tube Mill, etc.)**  
Allis-Chalmers Mfg. Co.  
F. L. Smidth & Co.

**Bar Benders and Cutters**  
Koehring Co.

**Batchers**  
Fuller Company

**Bearings**  
Chain Belt Co.  
Link-Belt Co.  
Joseph T. Ryerson & Son, Inc.  
Timken Roller Bearing Co.

**Bearings (Anti-Friction)**  
Timken Roller Bearing Co.

**Bearings (Roller)**  
Timken Roller Bearing Co.

**Bearings (Tapered Roller)**  
Timken Roller Bearing Co.

**Bearings (Thrust)**  
Timken Roller Bearing Co.

**Belt Fasteners**  
Flexible Steel Lacing Co.

**Belt Lacing (Steel)**  
Flexible Steel Lacing Co.

**Belting (Elevator and Conveyor)**  
B. F. Goodrich Co.  
Goodyear Tire & Rubber Co., Inc.

**Belting (Metal, Conveyor, High and Low Temperature)**  
Wickwire Spencer Steel Co.

**Belting (Transmission)**  
B. F. Goodrich Co.  
Goodyear Tire & Rubber Co., Inc.

**Belting (V Type)**  
B. F. Goodrich Co.  
Goodyear Tire & Rubber Co., Inc.

**Bin Gates**  
Chain Belt Co.  
Fuller Co.  
Link-Belt Co.  
Sprout, Waldron & Co., Inc.  
Traylor Eng. & Mfg. Co.

**Bins**  
Austin-Western Road Machy. Co. (Sand and Gravel)  
Pioneer Gravel Equip. Mfg. Co. (Steel)  
Traylor Eng. & Mfg. Co.

**Blasting Cap Protectors**  
B. F. Goodrich Co.

**Blasting Machines**  
Atlas Powder Co.  
Hercules Powder Co.

**Blasting Supplies**  
Atlas Powder Co.  
Hercules Powder Co.

**Blasting Powder (See Powder, Blasting)**

**Blocks (Pillow, Roller Bearing)**  
Link-Belt Co.  
Timken Roller Bearing Co.

**Blocks (Sheave)**  
American Manganese Steel Co.

**Bodies (Car & Motor Truck)**  
Easton Car & Construction Co.  
Hug Company

**Boilers**  
Babcock & Wilcox Co.

**Boots and Shoes**  
B. F. Goodrich Co.

**Breakers (Primary)**  
Smith Engineering Works  
Williams Patent Crusher & Pulv. Co.

**Bucket Dumps**  
Dempster Bros., Inc.

**Buckets (Clamshell, Grab, Orange Peel, etc.)**  
Geo. Haiss Mfg. Co., Inc.  
Harnischfeger Corp.  
Hayward Company  
Link-Belt Co.  
Owen Bucket Co.

**Buckets (Dragline and Slack-line)**  
American Manganese Steel Co.  
Bucyrus-Erie Co.  
Owen Bucket Co.  
Page Engineering Co.  
Pioneer Gravel Equip. Mfg. Co.

**Buckets (Dredging and Excavating)**  
Harnischfeger Corp.  
Owen Bucket Co.

**Buckets (Elevator and Conveyor)**  
Chain Belt Co.  
Cross Engineering Co.  
Hendrick Mfg. Co.  
Jeffrey Mfg. Co.  
Link-Belt Co.  
Pioneer Gravel Equip. Mfg. Co.  
Taylor-Wharton Iron & Steel Co.

**Bulldozers**  
Koehring Co.

**Bushings (Machined or Processed)**  
Manganese Steel Forge Co., Inc.

**Cableways**  
Broderick & Bascom Rope Co.  
Link-Belt Co.  
John A. Roebing's Sons Co.  
Williamsport Wire Rope Co.

**Calcinators**  
Bradley Pulverizer Co.

**Calcining Kettles (Gypsum)**  
J. B. Ehrsam & Sons Mfg. Co.

**Cap Crimpers and Fuse Cutters**  
Ensign-Bickford Co.

**Caps (Blasting)**  
Atlas Powder Co.  
Hercules Powder Co.

**Car Pullers**  
Link-Belt Co.

**Cars (Quarry & Gravel Pit)**  
Austin-Western Road Machy. Co.  
Easton Car & Construction Co.  
Koppel Industrial Car & Equip. Co.

**Castings**  
Babcock & Wilcox Co.  
Eagle Iron Works (Grey Iron)  
Link-Belt Co.  
Timken Roller Bearing Co.

**Cement Making Machinery**  
Manitowoc Engr. Works  
F. L. Smidth & Co.

**Cement Process**  
Cement Process Corp.

**Cement Pumps**  
Fuller Co.  
F. L. Smidth & Co.

**Central Mixing Plants**  
Chain Belt Co. (Concrete)

**Chain (Dredge and Steam Shovel)**  
Bucyrus-Erie Co.  
Jeffrey Mfg. Co.

**Chain (Elevating and Conveying)**  
American Manganese Steel Co.  
Chain Belt Co.  
Link-Belt Co.

**Chain Drives**  
Chain Belt Co.

**Chain Systems (Kilns)**  
F. L. Smidth & Co.

**Chute or Launder Lining**  
B. F. Goodrich Co.  
Goodyear Tire & Rubber Co., Inc.

**Chutes and Chute Liners**  
American Manganese Steel Co.  
Cross Engineering Co.  
Manganese Steel Forge Co., Inc.

**Clarifiers**  
Hardinge Co., Inc.

**Classifiers**  
Hardinge Co., Inc.  
Link-Belt Co.

**Clay Working Machinery**  
Bonnot Company

**Clips (Wire Rope)**  
Broderick & Bascom Rope Co.  
Williamsport Wire Rope Co.

**Coal Crushers and Rolls**  
Austin-Western Road Machy. Co.  
Williams Patent Crusher & Pulv. Co.

**Coal Pulverizing Equipment**  
Babcock & Wilcox Co.  
Bonnot Company  
Bradley Pulverizer Co.  
Gruendler Crusher & Pulv. Co.  
Pennsylvania Crusher Co.  
Raymond Bros. Impact Pulv. Co.  
F. L. Smidth & Co.  
Williams Patent Crusher & Pulv. Co.

**Compressed Air Rock Drills**  
Chicago Pneumatic Tool Co.  
Cleveland Rock Drill Co.

**Compressors (See Air Compressors)**

**Concrete Breakers**  
Ingersoll-Rand Co.

**Concrete Pipe Machinery**  
Universal Concrete Pipe Co.

**Concrete Slab Raising Equipment (Mud-Jack)**  
Koehring Co.

**Conveyor Belting (See Belting)**

**Conveyor Idlers and Rolls**  
Chain Belt Co.  
Link-Belt Co.

**Conveyors and Elevators**  
Earle C. Bacon, Inc.  
Chain Belt Co.  
Fuller Company  
Jeffrey Mfg. Co. (Vibrating)  
Lewistown Fdy. & Mach. Co.  
Link-Belt Co.  
Pioneer Gravel Equip. Mfg. Co.

**Robins Conveying Belt Co**  
F. L. Smidth & Co.  
Smith Engineering Works  
Sturtevant Mill Co.  
Traylor Eng. & Mfg. Co.

**Conveyors (Pneumatic)**  
Fuller Company

**Conveyors (Screw)**  
Link-Belt Co.

**Conveyors (Weighs)**  
Richardson Scale Co.

**Coolers (See Kilns and Coolers Rotary)**

**Correcting Basins**  
F. L. Smidth & Co.

**Couplings (Air Hose)**  
Cleveland Rock Drill Co.  
Ingersoll-Rand Co.

**Couplings (Flexible and Shaft)**  
Chain Belt Co.  
Link-Belt Co.

**Couplings (Hose, Pipe, etc.)**  
B. F. Goodrich Co.

**Cranes (Clamshell)**  
Austin-Western Road Machy. Co.  
Bucyrus-Erie Co.  
Harnischfeger Corp.  
Koehring Co.  
Manitowoc Engr. Works

**Cranes (Crawler and Locomotive)**  
Austin-Western Road Machy. Co.

**Cranes (Excavator)**  
Koehring Co.

**Cranes (Overhead Traveling)**  
Harnischfeger Corp.

**Crusher Parts**  
American Manganese Steel Co.  
Pennsylvania Crusher Co.  
Taylor-Wharton Iron & Steel Co. (Manganese)

**Crushers (Hammer)**  
Dixie Machy. Mfg. Co.  
Gruendler Crusher & Pulv. Co.  
Jeffrey Mfg. Co.  
Pennsylvania Crusher Co.  
Sturtevant Mill Co.  
Williams Patent Crusher & Pulv. Co.

**Crushers (Jaw and Gyratory)**  
Allis-Chalmers Mfg. Co.  
Austin-Western Road Machy. Co.  
Earle C. Bacon, Inc.  
Birdsboro Steel Foundry & Mach. Co.  
C. G. Buchanan Co., Inc.  
Jeffrey Mfg. Co.  
Lewistown Fdy. & Mach. Co. (Jaw)  
Nordberg Mfg. Co.  
Pennsylvania Crusher Co.  
Pioneer Gravel Equip. Mfg. Co.  
Smith Engineering Works  
Traylor Eng. & Mfg. Co.

# *Gulf Lubcote* .. **THE QUALITY LUBRICANT FOR**

*Wire Rope*

*Destruction Test Under  
Pulsating Load*



INDUSTRIAL  
LUBRICATION

Many plant operators report that *Gulf Lubcote* has more than doubled the life of wire rope

NOW YOU can use a petroleum product which will greatly increase the service life of wire rope—Gulf Lubcote.

This product has been developed after exhaustive experiments to determine the best type of lubricant to give wire rope lasting strength under continual stressing and slackening. It is made in six grades to meet every operating condition.

Many industrial plants are putting Gulf Lubcote to work, with excellent results. Ask the Gulf representative how the use of Gulf Lubcote can save you money.

*In Gulf's modern research laboratory wire rope is tested in the pulsating tensile testing apparatus shown above. Thus, Gulf scientists get first-hand knowledge of causes of cable failure and how to improve its resistance to fatigue by the proper use and application of the correct grade of Gulf Lubcote.*

**GULF OIL CORPORATION—GULF REFINING COMPANY**  
GENERAL OFFICES, GULF BLDG., PITTSBURGH, PA.

*Makers of That Good Gulf Gasoline and Gulfube Motor Oil*

## Classified Directory—Continued

**Crushers (Reduction)**  
Austin-Western Road Machy.  
Co.  
**Bonnot Company**  
Jeffrey Mfg. Co.

**Crushers (Roll)**  
Gruendler Crusher & Pulv. Co.  
Pioneer Gravel Equip. Mfg.  
Co.

**Crushers (Rotary)**  
J. B. Ehrsam & Sons Mfg.  
Co.

**Crushers (Single Roll)**  
Austin-Western Road Machy.  
Co.  
Gruendler Crusher & Pulv. Co.  
Jeffrey Mfg. Co.  
Link-Belt Co.  
McLanahan & Stone Corp.  
Pennsylvania Crusher Co.

**Crushing Rolls**  
Allis-Chalmers Mfg. Co.  
Babcock & Wilcox Co.  
Birdsboro Steel Foundry &  
Mach. Co.  
C. G. Buchanan Co., Inc.  
Jeffrey Mfg. Co.  
Sturtevant Mill Co.  
Traylor Eng. & Mfg. Co.

**Cupolas (Rock Wool)**  
Whiting Corp.

**Derricks and Derrick Fittings**  
Harnischfeger Corp.

**Detonators**  
Atlas Powder Co.  
Hercules Powder Co.

**Diaphragms (Pump)**  
B. F. Goodrich Co.

**Dipper Teeth (Manganese)**  
Taylor-Wharton Iron & Steel  
Co.

**Dippers (Manganese Steel)**  
American Manganese Steel  
Co.

**Dippers and Teeth (Steam  
Shovel)**  
American Manganese Steel  
Co.  
Bucyrus-Erie Co.  
The Frog Switch & Mfg. Co.  
Thew Shovel Co.

**Dirt Moving Equip. (Dumtior)**  
Koehring Co.

**Ditchers**  
Bucyrus-Erie Co.  
Harnischfeger Corp.

**Draglines**  
Bucyrus-Erie Co.  
Harnischfeger Corp.  
Link-Belt Co.  
Manitowoc Engr. Works  
Thew Shovel Co.

**Draglines (Gasoline or Electric)**  
Koehring Co.  
Manitowoc Engr. Works  
Northwest Engineering Co.  
Page Engineering Co.

**Dragline Excavators**  
Austin-Western Road Machy.  
Co.  
Bucyrus-Erie Co.  
Harnischfeger Corp.  
Michigan Power Shovel Co.  
Northwest Engineering Co.  
Page Engineering Co.  
Thew Shovel Co. (Electric,  
Gasoline and Steam)

**Dragline Cableway Excavators**  
Bucyrus-Erie Co.  
Link-Belt Co.  
Sauerman Bros.

**Dredge Pumps (See Pumps,  
Dredging)**

**Dredges**  
Bucyrus-Erie Co.  
Hayward Co.  
Hetherington & Berner, Inc.  
Morris Machine Works

**Dredging Sleeves**  
B. F. Goodrich Co.

**Drill Bits**  
Ingersoll-Rand Co.  
Timken Roller Bearing Co.

**Drill Sharpening Machines**  
Ingersoll-Rand Co.

**Drill Sharpening Service**  
A. Courchesne, Inc.

**Drill Steel**  
Cleveland Rock Drill Co.  
Ingersoll-Rand Co.

**Drilling Accessories**  
Cleveland Rock Drill Co.

**Drills**  
Bucyrus-Erie Co.  
Timken Roller Bearing Co.

**Drills (Diamond Core)**  
Chicago Pneumatic Tool Co.  
Ingersoll-Rand Co.

**Drills, Hammer (See Hammer  
Drills)**

**Drills (Rock)**  
Chicago Pneumatic Tool Co.  
Cleveland Rock Drill Co.  
A. Courchesne, Inc.  
Ingersoll-Rand Co.

**Drills (Tripod)**  
Cleveland Rock Drill Co.

**Drills (Wagon)**  
Cleveland Rock Drill Co.  
Ingersoll-Rand Co.

**Drives (Short Center)**  
Allis-Chalmers Mfg. Co.

**Dryers**  
Allis-Chalmers Mfg. Co.  
Babcock & Wilcox Co.  
Bonnot Company  
Hardinge Company, Inc.  
Manitowoc Engr. Works.  
Traylor Eng. & Mfg. Co.

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Koehring Co.

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American Fdy. Equip. Co.  
W. W. Sly Mfg. Co.  
Western Precipitation Co.

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Allis-Chalmers Mfg. Co.  
American Fdy. Equip. Co.  
Western Precipitation Co.

**Dust Conveying Systems**  
Fuller Company

**Dynamite**  
Atlas Powder Co.  
Hercules Powder Co.

**Electric Cables and Wires**  
John A. Roebling's Sons Co.

**Electric Mine Hoists**  
Nordberg Mfg. Co.

**Electric Power Equipment**  
Allis-Chalmers Mfg. Co.

**Elevator Belting (See Belting)**

**Emery Mills**  
Sturtevant Mill Co.

**Engineers**  
Bonnot Company  
Dorr Co.  
Fuller Co.  
Hetherington & Berner, Inc.  
Productive Equipment Corp.  
F. L. Smidth & Co.  
Sturtevant Mill Co.

**Engines (Diesel)**  
Chicago Pneumatic Tool Co.  
Ingersoll-Rand Co.  
Nordberg Mfg. Co.

**Engines (Steam)**  
Morris Machine Works

**Excavating Machinery (See  
Shovels, Cranes, Buckets,  
etc.)**

**Excavators (Crawling Tractor)**  
Koehring Co.

**Excavators (Dragline)**  
Koehring Co.

**Explosives**  
Atlas Powder Co.  
Hercules Powder Co.

**Fans (Exhaust)**  
Jeffrey Mfg. Co.  
W. W. Sly Mfg. Co.

**Feeders**  
Babcock & Wilcox Co. (Pul-  
verized Coal)  
Chain Belt Co.  
Fuller Co. (Cement and Pul-  
verized Material)  
Hardinge Company, Inc.  
(Weighing)  
Jeffrey Mfg. Co. (Pan and  
Tube)  
Pioneer Gravel Equip. Mfg.  
Co.  
Smith Engineering Works  
(Plate)

**Filters (Air)**  
W. W. Sly Mfg. Co.

**Filters (Dust)**  
W. W. Sly Mfg. Co.

**Forgings**  
Manganese Steel Forge Co.,  
Inc. (Steel)  
Taylor-Wharton Iron & Steel  
Co.

**Frogs and Switches**  
Taylor-Wharton Iron & Steel  
Co.

**Fuses (Detonating and Safety)**  
Ensign-Bickford Co.

**Gaskets**  
B. F. Goodrich Co.  
Goodyear Tire & Rubber Co.,  
Inc.

**Gasoline**  
Texas Company

**Gears (Spur, Helical & Worm)**  
Jeffrey Mfg. Co.  
Taylor-Wharton Iron & Steel  
Co.

**Gears and Pinions**  
Chain Belt Co.  
Link-Belt Co.  
Taylor-Wharton Iron & Steel  
Co.

**Gelatin and Semi-Gelatin (See  
Explosives)**

**Grapples**  
Owen Bucket Co.

**Grease**  
Gulf Refining Co.  
Texas Company

**Grinding Balls**  
Babcock & Wilcox Co.

**Grizzlies**  
American Manganese Steel  
Co.  
Jeffrey Mfg. Co. (Vibrating)  
Productive Equipment Corp.  
Smith Engineering Works  
Traylor Eng. & Mfg. Co.

**Grizzly Feeders**  
Jeffrey Mfg. Co.  
Traylor Eng. & Mfg. Co.

**Gypsum Plaster Plants**  
J. B. Ehrsam & Sons Mfg. Co.

**Hammer Drills**  
Chicago Pneumatic Tool Co.  
Cleveland Rock Drill Co.  
Ingersoll-Rand Co.

**Hammer Mills (See Crushers)**

**Hoists**  
Chicago Pneumatic Tool Co.  
Harnischfeger Corp.  
Ingersoll-Rand Co.  
Link-Belt Co.  
Northwest Engineering Co.  
Pioneer Gravel Equip. Mfg.  
Co.

**Hose (Water, Steam, Air Drill,  
Pneumatic, Sand Suction  
and Discharge)**

Chicago Pneumatic Tool Co.  
Cleveland Rock Drill Co.  
B. F. Goodrich Co.  
Goodyear Tire & Rubber Co.,  
Inc.  
Ingersoll-Rand Co.

**Hose Couplings (See Couplings  
—Hose, Pipe, etc.)**

**Kilns and Coolers (Rotary)**

Allis-Chalmers Mfg. Co.  
Bonnot Company  
Manitowoc Engr. Works  
F. L. Smidth & Co.  
Traylor Eng. & Mfg. Co.

**Kominuters (See Mills)**

**Laboratory Crushers**  
Sturtevant Mill Co.

**Lamp Guards**  
Flexible Steel Lacing Co.

**Lighters, Hot Wire (For Safety  
Fuse)**  
Ensign-Bickford Co.

**Lime Handling Equipment**  
Fuller Company  
Link-Belt Co.  
Raymond Bros. Impact Pulv.  
Co.

**Lime Kilns (See Kilns and  
Coolers, Rotary)**

**Linings (Iron for Ball and Tube  
Mills) (See Mill Liners)**

**Linings (Rubber for Chutes,  
Ball and Tube Mills, Tank  
and Pipe)**  
B. F. Goodrich Co.

**Loaders and Unloaders**

Bucyrus-Erie Co.  
Fuller Company  
Geo. Haisa Mfg. Co., Inc.  
Jeffrey Mfg. Co.  
Link-Belt Co.  
Northwest Engineering Co.

**Locomotive Cranes (See Cranes,  
Crawler and Locomotive)**

**Locomotive (Electric)**  
Jeffrey Mfg. Co.

**Locomotives (Storage Battery)**  
Jeffrey Mfg. Co.

**Log Washer**

McLanahan & Stone Corp.  
Smith Engineering Works

**Lubricants**

Broderick & Bascom Rope Co.  
(Wire Rope)  
Gulf Refining Co.  
Texas Company

**Machinery Guards**  
Harrington & King Perforat-  
ing Co.

**Magnetic Pulleys**  
Birdsboro Steel Foundry &  
Mach. Co.

C. G. Buchanan Co., Inc.  
**Manganese Steel (Plates and  
Sheets)**  
Manganese Steel Forge Co.,  
Inc.

**Manganese Steel Castings**  
American Manganese Steel  
Co.  
The Frog Switch & Mfg. Co.  
Taylor-Wharton Iron & Steel  
Co.

**Manganese Steel Parts**  
American Manganese Steel  
Co.

Manganese Steel Forge Co.,  
Inc.  
Taylor-Wharton Iron & Steel  
Co.

**Manganese Welding Rod**  
Taylor-Wharton Iron & Steel  
Co.

**Mechanical Rubber Goods**  
B. F. Goodrich Co.

**Mill Liners and Linings (Iron  
for Ball and Tube Mills)**  
Babcock & Wilcox Co.  
F. L. Smidth & Co.

**Mills, Grinding (Ball, Tube,  
etc.) (See also Crushers,  
Hammer)**

Allis-Chalmers Mfg. Co.  
Bonnot Company  
Bradley Pulverizer Co.  
Gruendler Crusher & Pulv. Co.  
Hardinge Co., Inc.  
Raymond Bros. Impact Pulv.  
Co.

F. L. Smidth & Co.  
Traylor Eng. & Mfg. Co.  
Williams Patent Crusher &  
Pulv. Co.

**Mine Handling Equipment**  
Chain Belt Co.

**Mixers (Commercial Concrete)**  
Jaeger Machine Co.

**Mixers (Concrete)**  
Gruendler Crusher & Pulv. Co.  
Koehring Co.

**Motor Trucks**  
Hug Company

**Motors and Generators (Electric  
Units)**

Allis-Chalmers Mfg. Co.  
Harnischfeger Corp.

**Nozzles (Gravel Washing)**  
Chain Belt Co.

**Oil Burners**  
Babcock & Wilcox Co.  
F. L. Smidth & Co.

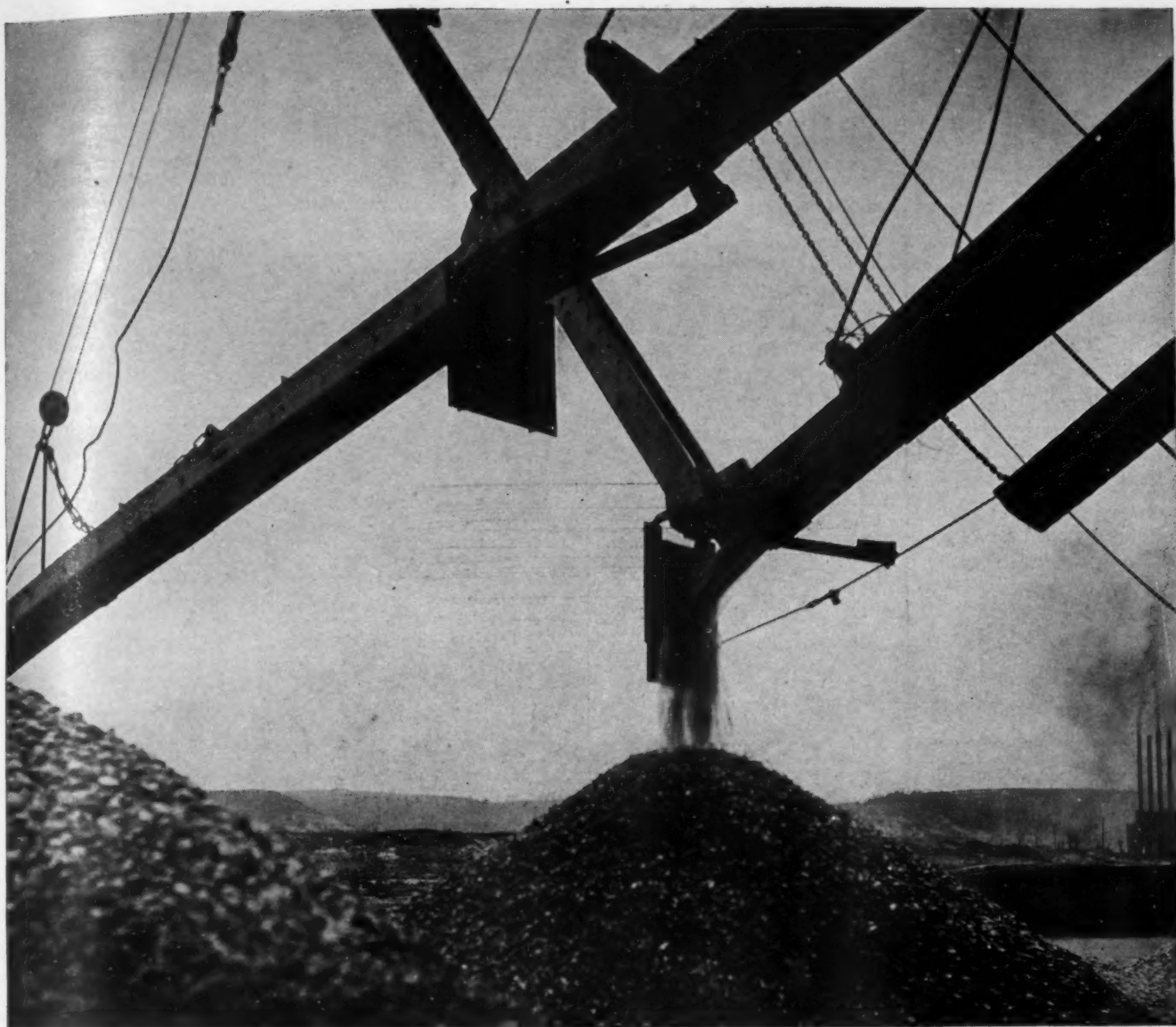
**Oils (Lubricating)**  
Gulf Refining Co.  
Texas Company

**Packings (Pump, Valve, etc.)**  
B. F. Goodrich Co.  
Goodyear Tire & Rubber Co.,  
Inc.

**Paint (Asphalt)**

Texas Company  
**Pavers (Concrete)**  
Koehring Co.  
**Perforated Metal**  
Chicago Perforating Co.  
Cross Engineering Co.  
Harrington & King Perforat-  
ing Co.

Hendrick Mfg. Co.  
Taylor-Wharton Iron & Steel  
Co. (Manganese)  
Wickwire Spencer Steel Co.



## RUBBER PILLOWS FOR GRAVEL CHUTES


### *A typical example of Goodrich improvement in rubber*


**B**ANG! And a ton of sharp gravel pours down the steel chute, smacks the steel baffle plate, and drops on the pile. OK for the gravel but hard on the steel—expensive chutes and baffle plates were wearing out in quick succession.

Then Goodrich developed a rubber that withstands abrasion, and a method of attaching it to steel. Now chutes and plates, covered with Goodrich rubber, *outlast the toughest steel by 10 times!*

Two Goodrich developments that revolutionize method and cost in one industry. Do you know that there are

others, daily cutting costs and improving products in other fields—perhaps your own? In the hands of Goodrich engineers rubber has been made to—


—flex indefinitely without breaking . . . and Goodrich transmission belts  set new performance records as a result.

—resist chemicals, oil, time itself . . . and Goodrich-lined tanks  and pipes drastically reduce pickling, plating, chemical handling costs; Goodrich

# Goodrich

ALL *products* *problems* IN RUBBER

hose lasts longer; Goodrich gaskets form life-long seals.

—adhere to metal . . . and industry benefits by longer-lived ball mills  and chutes, vibration dampeners for machinery, rubber-lined tanks, tank-cars and pipe.

In developing these new forms, new compounds, Goodrich engineers have learned how to make many improvements in rubber. All these new qualities go into all Goodrich products—belting, hose, packing, molded articles—to make them better values. The B. F. Goodrich Company, Mechanical Rubber Goods Division, Akron, Ohio.

## Classified Directory—Continued

**Pipe Molds (Concrete)**  
Universal Concrete Pipe Co.

**Plaster Board and Wallboard Equipment**  
J. B. Ehrsam & Sons Mfg. Co.

**Plates (Double Corrugated)**  
Hendrick Mfg. Co.

**Pneumatic Drills (See Drills)**

**Portable Compressors**  
Ingersoll-Rand Co.

**Portable Conveyors**  
Fuller Company  
Geo. Haiss Mfg. Co., Inc.  
Link-Belt Co.

**Portable Crushing and Screening Unit**  
Austin-Western Road Machy. Co.

**Pioneer Gravel Equip. Mfg. Co.**

**Smith Engineering Works**  
Williams Patent Crusher & Pulv. Co.

**Powder (Blasting)**  
Atlas Powder Co.  
Hercules Powder Co.

**Precipitators**  
Western Precipitation Co.

**Pulleys, Magnetic (See Magnetic Pulleys)**

**Pulverators**  
Allis-Chalmers Mfg. Co.

**Pulverizers (See also Crushers, Mills, etc.)**  
Allis-Chalmers Mfg. Co.  
Austin-Western Road Machy. Co.

**Babcock & Wilcox Co.**

**Bonnot Company**

**Bradley Pulverizer Co.**

**Dixie Machy. Mfg. Co.**

**Gruendler Crusher & Pulv. Co.**

**Jeffrey Mfg. Co.**

**Pennsylvania Crusher Co.**

**Raymond Bros. Impact Pulv. Co.**

**F. L. Smidth & Co.**

**Sturtevant Mill Co.**

**Williams Patent Crusher & Pulv. Co.**

**Pulverizer Parts**  
American Manganese Steel Co.

**Pumps (Air Lift)**  
Fuller Company

**Pumps (Cement)**  
Fuller Company

**Pumps (Cement Slurry)**  
American Manganese Steel Co.

**Morris Machine Works**

**F. L. Smidth & Co.**

**A. R. Wilfley & Sons**

**Pumps (Centrifugal)**  
Allis-Chalmers Mfg. Co.

**Hetherington & Berner, Inc.**

**Ingersoll-Rand Co.**

**Morris Machine Works**

**A. R. Wilfley & Sons**

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Easton Car & Construction Co.

**Ready Mixed Concrete (Truck Mixer Bodies)**  
Chain Belt Co.

**Recovery Plants (Dust)**  
W. W. Sly Mfg. Co.

**Recuperators**  
Manitowoc Engr. Works

**Reinforcement Fabric (Concrete)**  
Wickwire Spencer Steel Co.

**Road Machinery**  
Harnischfeger Corp.

**Rock Bits (See Drill Bits)**

**Rock Drills (See Drills, Rock)**

**Rock Wool Machinery**  
Whiting Corp.

**Rod Mills**  
Traylor Eng. & Mfg. Co.

**Rods (Wire)**  
Wickwire Spencer Steel Co.

**Roller Bearings**  
Timken Roller Bearing Co.

**Roofing (Ready to Lay)**  
Texas Company

**Roofing and Siding (Steel)**  
Joseph T. Ryerson & Son, Inc.

**Rope, Wire (See Wire Rope)**

**Rubber Covered Screens**  
B. F. Goodrich Co.

**Sand Drag**  
Smith Engineering Works

**Sand and Gravel Handling Equip.**  
Sprout, Waldron & Co., Inc.

**Sand Separators**  
Pioneer Gravel Equip. Mfg. Co.

**Sand Settling Tanks**  
Link-Belt Co.

**Pioneer Gravel Equip. Mfg. Co.**

**Smith Engineering Works**

**Scales (Automatic Proportioning)**  
Richardson Scale Co.

**Scales (Cement)**  
Richardson Scale Co.

**Scrapers (Power Drag)**  
Austin-Western Road Machy. Co.

**Harnischfeger Corp.**

**Link-Belt Co.**

**Northwest Engineering Co.**

**Pioneer Gravel Equip. Mfg. Co.**

**Sauerman Bros.**

**Screens**  
Allis-Chalmers Mfg. Co.

**American Manganese Steel Co.**

**Earle C. Bacon, Inc.**

**Chicago Perforating Co.**

**Cleveland Wire Cloth & Mfg. Co.**

**Cross Engineering Co.**

**Harrington & King Perf. Co.**

**Hendrick Mfg. Co.**

**Jeffrey Mfg. Co.**

**Link-Belt Co.**

**Manganese Steel Forge Co., Inc.**

**National Wire Cloth Co.**

**Nordberg Mfg. Co.**

**Pioneer Gravel Equip. Mfg. Co.**

**John A. Roebling's Sons Co.**

**Simplicity Eng. Co.**

**Smith Engineering Works**

**Sturtevant Mill Co.**

**Traylor Eng. & Mfg. Co.**

**Universal Vibrating Screen Co.**

**Screens, Scalping (Hercules and Standard)**  
Smith Engineering Works

**Screens (Vibrating)**  
Austin-Western Road Machy. Co.

**Link-Belt Co.**

**Nordberg Mfg. Co.**

**Pioneer Gravel Equip. Mfg. Co.**

**Robins Conveying Belt Co.**

**Simplicity Eng. Co.**

**Smith Engineering Works**

**Sturtevant Mill Co.**

**W. S. Tyler Co.**

**Williams Patent Crusher & Pulv. Co.**

**Screens, Washing (Hercules, Ajax and Standard)**  
Smith Engineering Works

**Screens (Woven Wire)**  
Wickwire Spencer Steel Co.

**Screw Rewasher (Single and Twin)**  
Smith Engineering Works

**Scrubbers, Washers**

**Allis-Chalmers Mfg. Co.**

**Hardinge Company, Inc.**

**Smith Engineering Works**

**Seal Rings**  
Traylor Eng. & Mfg. Co.

**Separators (Magnetic)**  
Birdsboro Steel Foundry & Mach. Co.

**C. G. Buchanan Co., Inc.**

**Separators (Slurry)**  
F. L. Smidth & Co.

**Shovel Repair Parts (Manganese)**  
Taylor-Wharton Iron & Steel Co.

**Shovels, Power (Steam, Gas, Electric, Diesel, Oil)**  
Bucyrus-Erie Co.

**Harnischfeger Corp.**

**Koehring Co.**

**Link-Belt Co.**

**Manitowoc Engr. Works**

**Michigan Power Shovel Co.**

**Northwest Engineering Co.**

**Thew Shovel Co. (Crawling Tractor)**

**Silos**  
F. L. Smidth & Co.

**Skip Hoists and Skips**  
Link-Belt Co.

**Slings (Wire Rope)**  
A. Leschen & Sons Rope Co.

**John A. Roebling's Sons Co.**

**Williamsport Wire Rope Co.**

**Speed Reducers**  
Link-Belt Co.

**Traylor Eng. & Mfg. Co.**

**Springs (Extension, Compression, Torsion or Flat)**  
Wickwire Spencer Steel Co.

**Sprockets and Chain**  
Chain Belt Co.

**Jeffrey Mfg. Co.**

**Taylor-Wharton Iron & Steel Co.**

**Steam Shovel Repair Parts**  
American Manganese Steel Co.

**Steel (Abrasion Resisting)**  
Joseph T. Ryerson & Son, Inc.

**Steel Bars**  
Timken Roller Bearing Co.

**Steel (Bars, Shapes, Plates, etc.)**  
Joseph T. Ryerson & Son, Inc.

**Steel (Electric Furnace)**  
Timken Roller Bearing Co.

**Steel (Open Hearth)**  
Timken Roller Bearing Co.

**Steel (Special Alloy)**  
Timken Roller Bearing Co.

**Steel (Special Analysis)**  
Timken Roller Bearing Co.

**Steels, Drill (See Drill Steel)**

**Stokers**  
Babcock & Wilcox Co.

**Tanks**  
Link-Belt Co.

**Pioneer Gravel Equip. Mfg. Co.**

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B. F. Goodrich Co.

**Tools (Pneumatic)**  
Ingersoll-Rand Co.

**Track Equipment**  
Nordberg Mfg. Co.

**Taylor-Wharton Iron & Steel Co.**

**Track Shifters**  
Nordberg Mfg. Co.

**Tractors**  
Koehring Co.

**Tramways (Aerial Wire Rope)**  
Broderick & Bascom Rope Co.

**A. Leschen & Sons Rope Co.**

**John A. Roebling's Sons Co.**

**Williamsport Wire Rope Co.**

**Transmission Belting (See Belting)**

**Transmission Machinery**  
Allis-Chalmers Mfg. Co.

**Timken Roller Bearing Co.**

**Truck Bodies (Dump)**  
Easton Car & Construction Co.

**Truck Bodies (Ready Mixed Concrete)**  
Jaeger Machine Co.

**Trucks (Mixers)**  
Jaeger Machine Co.

**Trucks and Trailers (See Motor Trucks)**

**Tube Mills (See Mills, Ball, Tube, etc.)**

**Tube Mill Liners (See Mill Liners)**

**Tubing (Blasting)**  
B. F. Goodrich Co.

**Tubing (Seamless Steel)**  
Timken Roller Bearing Co.

**Underground Shovels**  
Nordberg Mfg. Co.

**Underground Loaders**  
Thew Shovel Co.

**Valves (Air)**  
Cleveland Rock Drill Co.

**Valves (Pump)**  
B. F. Goodrich Co.

**Vibrating Screens (See Screens, Vibrating)**

**Washers (Sand, Gravel and Stone)**  
Allis-Chalmers Mfg. Co.

**Austin-Western Road Machy. Co.**

**Eagle Iron Works**

**Gruendler Crusher & Pulv. Co.**

**Link-Belt Co.**

**Pioneer Gravel Equip. Mfg. Co.**

**Traylor Eng. & Mfg. Co.**

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Richardson Scale Co.

**Weigh-Mix**  
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**Wire (Piano and Music)**  
Wickwire Spencer Steel Co.

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**Manganese Steel Forge Co., Inc.**

**National Wire Cloth Co.**

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**Taylor-Wharton Iron & Steel Co. (Manganese)**

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**Wickwire Spencer Steel Co.**

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**Wire Rope Slings (See Slings, Wire Rope)**

**Wire Rope Sockets (See Sockets, Wire Rope)**

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## Crush 36 in. Rock to 1 $\frac{1}{4}$ in. in One Operation

With One Williams Crusher—Saving in Investment of 50% to 75%

(A Size Crusher for every job)  
(Capacities 3 to 300 tons per hour)

Power Shovel loaded rock reduced to commercial size in one operation with one Williams Crusher. Saves much sledging and avoids secondary blasting—Saves by use of smaller buildings, fewer foundations, conveyors, drives and motors. Write for literature.



CUTAWAY VIEW  
of a Williams "Jumbo Junior" Crusher,  
Showing Hammers and Sizing Grates.



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**WILLIAMS**  
OLDEST AND LARGEST BUILDERS OF HAMMERMILLS IN THE WORLD  
**WILLIAMS**  
PATENT CRUSHERS GRINDERS SHREDDERS

A Williams  
Crushed  
Product

(Actual Photo)  
Note the cubular  
form of Product  
with no slivers  
and slabs.



Both samples taken  
from the same quarry

Ordinary  
Crushed  
Product

(Actual Photo)  
Note slivers and  
slabs not crushed  
by a Williams  
crusher.

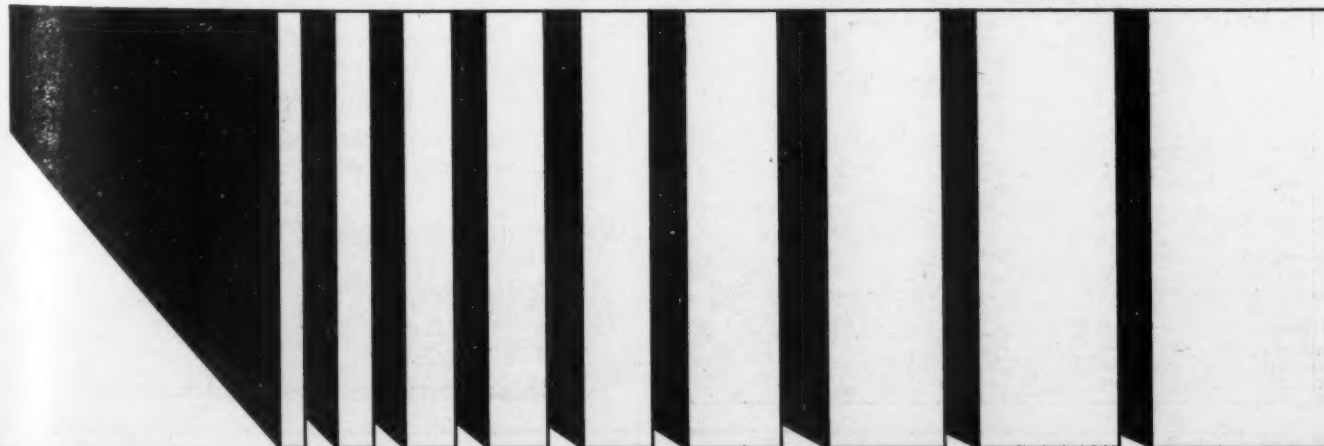


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Rol-Man Rolled True (11% to 14%) Manganese Steel Wear Resisting Plates available for immediate shipment; any size up to 54" x 120", in  $\frac{1}{8}$ ",  $\frac{3}{16}$ ",  $\frac{1}{4}$ ",  $\frac{5}{16}$ ",  $\frac{3}{8}$ ",  $\frac{1}{2}$ ",  $\frac{5}{8}$ ",  $\frac{3}{4}$ " and 1" thickness. Plates sheared to your specification, and holes punched and countersunk if desired; plates also curved, formed, flanged or welded to meet your requirements. Rol-Man ROUNDS, SQUARES and FLATS in all sizes available for prompt shipment.

MANGANESE STEEL FORGE CO., CASTOR AVE. & BATH ST., PHILA.



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Performance  
Convertibility  
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Economy  
Stamina  
Speed

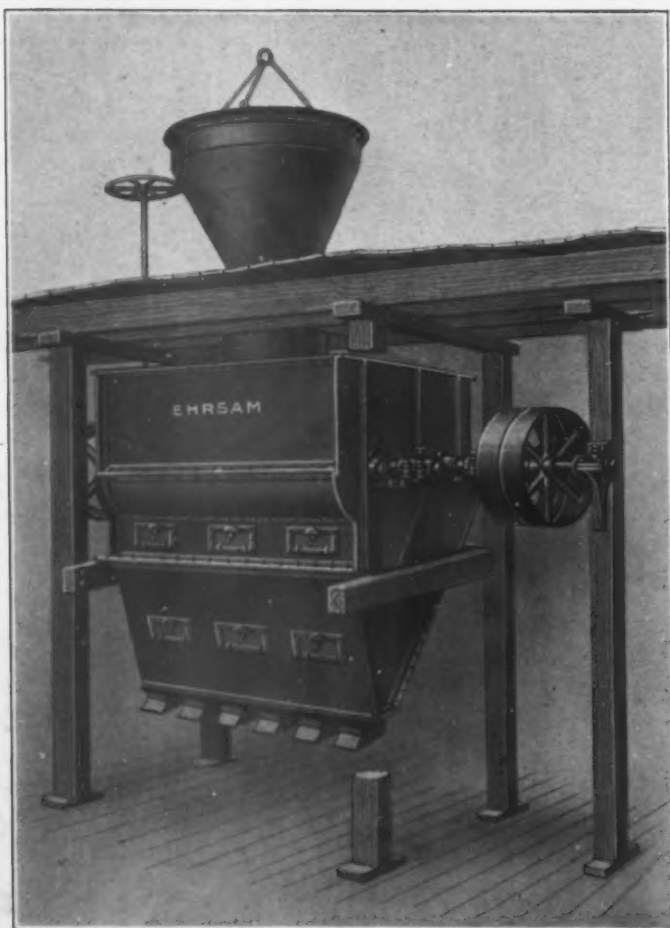
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model T-6

**MICHIGAN!**  
*has them all!*

**MICHIGAN POWER SHOVEL CO** BENTON HARBOR, MICHIGAN, U.S.A.



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### **Double Barrel Plaster MIXER**

For Mixing Dry Ingredients Such as Plaster-Paris or Stucco with Fibre and Retarder. Also various Ingredients with Stucco, Portland Cement, Lime and Sand.

Equipped for Hand Sacking or Bates Bagger.

Used in Gypsum Plaster Mills Throughout the United States.

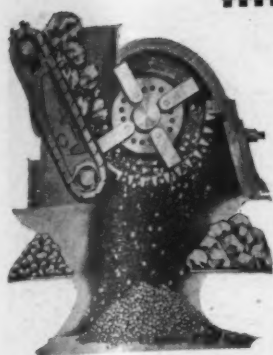
Capacities from Ten to Twenty Tons per Hour.

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We also have complete engineering service for the lay-out and general design of such plants.

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**The J. B. Ehram & Sons Mfg. Co.**  
ENTERPRISE KANSAS



# DIXIE

NON-CLOG  
HAMMER  
MILL

*Can Take  
It . . . . .*

Just one of many reasons is the famous DIXIE breaker plate with a surface twenty-six times the area of any standard type of breaker plate.

The DIXIE Hammer Mill handles tough, wet or sticky material but won't clog. A single operation reduces material to any predetermined size accurately.

Every part of the DIXIE is made of wear-resisting quality material. There are 40 sizes available for any capacity—Primary—Secondary or Fine Reduction.

Write for complete facts.

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DIE PERFORATED PLATES  
FOR YOUR TYPE OF SCREEN

### Cross Screen Plates and Sections

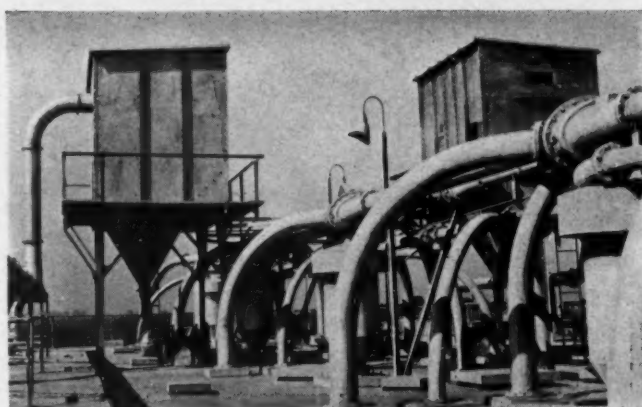


are SELF FRAMING  
LONG WEARING  
MORE EASILY INSTALLED  
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IMPROVE PRODUCT  
QUICKLY DELIVERED

You can SEE the quality of a Cross screen, but it is more than a matter of good looks. The quality goes all the way through.

**CROSS ENGINEERING CO.**

MAIN OFFICE AND MFG. PLANT  
CARBONDALE, PA.  
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## STOP *the* DUST *nuisance* *and hazard--at* **LOWEST COST**

SLY DUST FILTERS  
insure economical  
dust control in—

- ROCK CRUSHING
  - Trap Rock
  - Slate
  - Ore
  - Silica
  - Limestone
- GRINDING
  - Rock
  - Cement Clinker
  - Gypsum
  - Ore
- CONVEYORS
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- SCREENING
- AIR PUMPING  
SYSTEMS
- PACKING  
OPERATIONS
- BAG CLEANING
- SILOS

Sly Dust Filters offer you effective dust control at low first cost and low cost of operation.

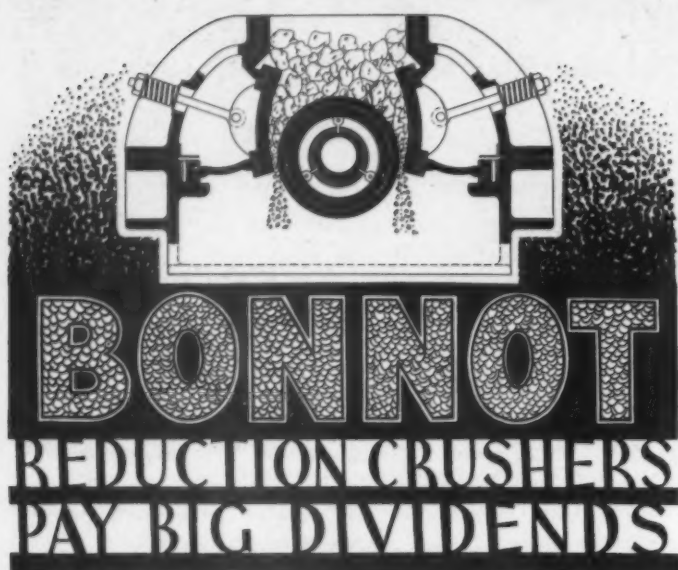
Sly Dust Filters give greatest filter cloth area per square foot of space.

Sly Dust Filters have an exclusive cloth bag arrangement. Dust is collected on OUTSIDE of bags and removed by the simplest kind of shaking device without injury to cloth. Bags are quickly and easily changed without interruption in service of filter.

We specialize in complete installations. What are your problems?

**CLOTH BAG**  
**SLY Dust Filters**  
**FOR DUST CONTROL**  
SUPPRESSION... POSITIVE COLLECTION... DISPOSAL

**THE W. W. SLY MANUFACTURING CO.**  
4730 Train Ave., Cleveland, Ohio



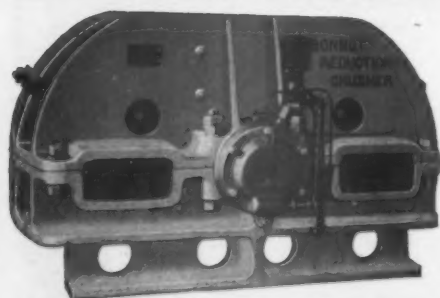
Bonnot Reduction Crushers NOW operating in Gravel Plants, Slag Plants, Stabilized Road Material, provide the real proof of actual savings of 50% in power, greatly reduced manganese costs. Ability to produce 1" minus or 3/4" minus material with high capacity meets with the present demand.

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Concaves are reversible—Liners are renewable—Safety plates of cast iron and other features designed for long wear and the economical, efficient and profitable operation of this rugged crusher definitely increase profits.

The BONNOT CRUSHER can be started fully loaded.

Our bulletin shows how material is made in one pass as compared with slabby material produced by less efficient crushers.



•  
**WRITE  
FOR  
BULLETIN  
No. 150**  
•

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Since 1891

NEW YORK OFFICE — 30 CHURCH STREET

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PLATE ...**

*by*  
**Hendrick**



REG. U.S. PAT. OFF.

**FOR EVERY PURPOSE ...**

With a complete line of all standard perforations ... round, square, hexagonal, slotted, staggered ... and many special designs ... like Squaround\* for example, Hendrick can handle all your perforated plate requirements. > > > They can be furnished in all commercially rolled metals, and delivered with characteristic Hendrick promptness. Give us a trial. > > >

\* Reg. U. S. Pat. Off.

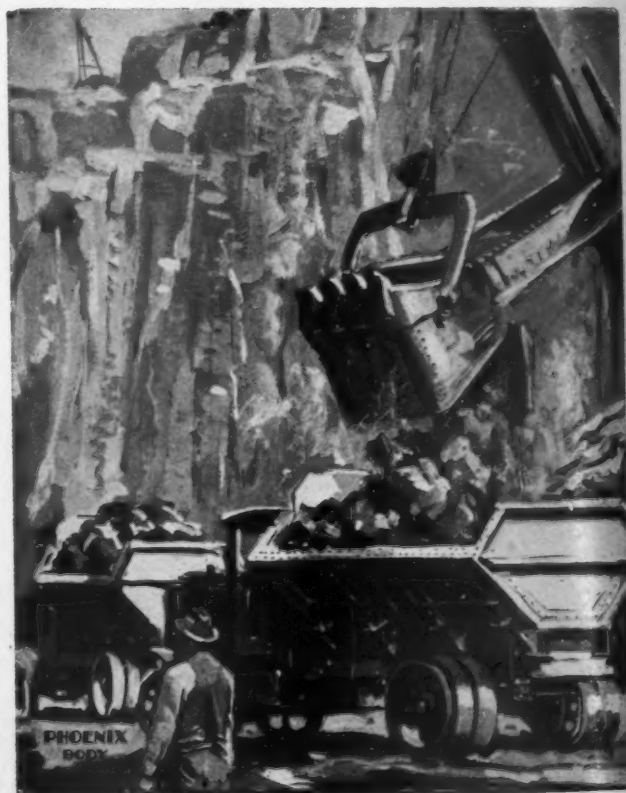
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# COMPLETE HYDRAULIC DREDGES



SAND AND GRAVEL DREDGING PUMPS  
AGITATING MACHINERY  
DREDGE HOISTS  
STEEL HULLS • PONTOONS  
PIPE LINE ACCESSORIES

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## LINK-BELT VIBRATING SCREEN

**A**LL materials, fine or coarse, light or heavy . . . clay, gravel, sand, ores, stone, etc. . . . yield to the wizardry of the mechanically-vibrated, Link-Belt Vibrating Screen, and classify themselves in strict accordance with their size. Its uniform vibration keeps the meshes open, and makes the screen's entire screening surface 100% effective. Send for Book No. 1462.

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Offices in Principal Cities

"Never Lets Go"

## ALLIGATOR STEEL BELT LACING

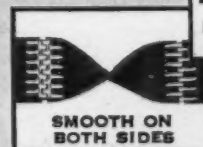
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GREAT  
STRENGTH



FLEXIBILITY



SMOOTH ON  
BOTH SIDES

For belts of all kinds and sizes. "The most universally used belt lacing on earth." Holds belt ends in vise-like compression grip. Separable. Joint usually lasts as long as the belt. Rocker hinge pin protects lacing against internal wear. Reliable for use wherever a belt will give efficient service. In 11 sizes for belts from tape up to  $\frac{3}{4}$  inch thick. Made also in MONEL Metal.

Sold the  
World  
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Sole Manufacturers

**FLEXIBLE STEEL LACING CO.**  
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Accept No  
Substitutes



TRADE MARK  
REG. U. S. PAT. OFF.

IMPROVED FEATURES.. NEW DESIGNS..  
ADDED REFINEMENTS..

in



**Owen Buckets**



Type "S"

Owen buckets have been improved each year for the past twenty-five years, but in no similar period have the improvements equalled

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**THE OWEN BUCKET COMPANY**

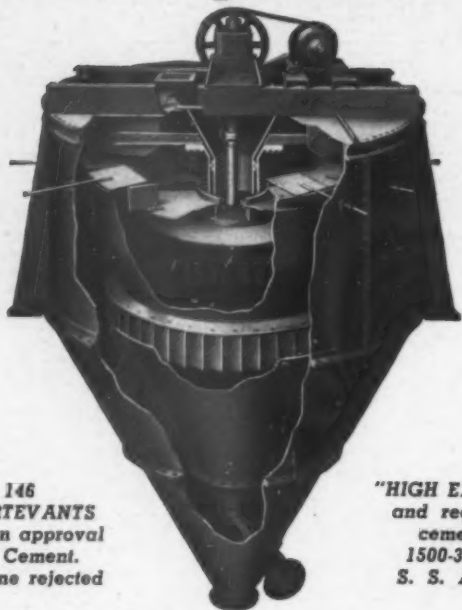
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*Air Separators*



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STURTEVANTS  
sold on approval  
for Cement.  
Not one rejected

"HIGH EARLY"  
and regular  
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1500-3300  
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Engineered Installations for raw or clinker show  
25 to 100% capacity increase.

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*No need to work  
in dust . . .*

**WE WILL SOLVE YOUR PROBLEM**

Cement

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*Put Your Dust Suppression  
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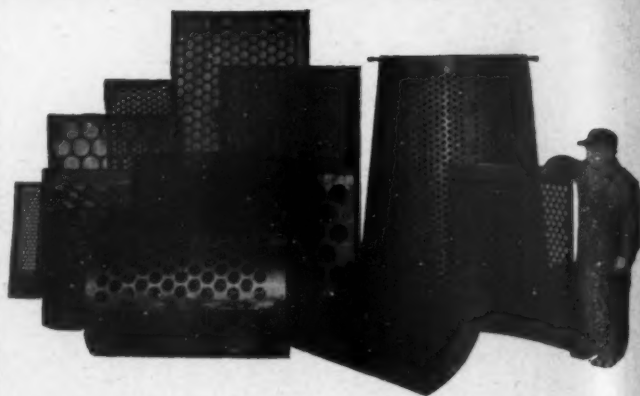
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A good volume of rock wool is today manufactured in Whiting water-jacketed cupolas. It is an inexpensive practical way to supply the growing demand for this popular insulating material. Write for further information.

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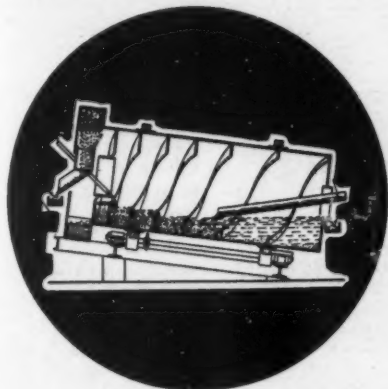
For Sand, Gravel, Stone and Ore. Perforations of all standard types, also of unusual sizes and layouts to give large production and reduced screening costs.

*The*  
**Harrington & King**  
PERFORATING CO.

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in the Hardinge Counter-Current Classifier. No internal moving parts. Once the fines—liquid or silt—is removed from the coarser particles—it stays removed—no chance to remix—no dead corners—no abrasions—acid resistant where necessary—very low in power. Products as fine as 325 mesh or as coarse as 1" have been treated. Salt, ores, abrasives, sand, chemicals and the like.



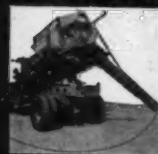
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*Preformed*

One of numerous quarries serviced by HAZARD reports LAY-SET Preformed materially reduced wire rope costs.

This is typical of how LAY-SET Preformed has been cutting rope costs for literally thousands of operators. Specify LAY-SET for your work.

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CLEVELAND SCREENS are star performers—returning larger capacities, increased profits and more accurate separations at lower cost. Cleveland Screens save money with the initial investment because, if they are made of the longer-wearing, wear-resisting ALLOY NO. 2—Cleveland Screens stay on the job long after ordinary screens would have been replaced.

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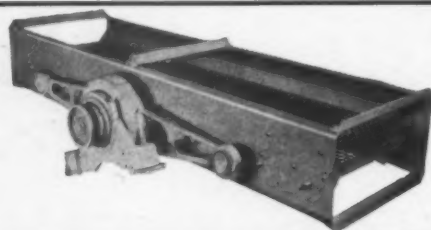
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## LET'S TALK FACTS

The UNIVERSAL Late Model Super-Vibrator costs less at the start. It costs less to operate and less to maintain. It gives you a higher capacity than more costly screens.

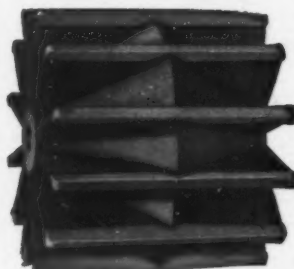
Separations are accurate and there is no blinding. You pay for 100% screen and save the cost of mysterious gadgets. These are only a few facts recognized by the many experienced operators who, when installing additional vibrating screens, reorder UNIVERSALS.

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Material conveyed cannot lodge between belt and pulley to cut your belts.

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—FOR—

CRUSHERS  
PULVERIZERS  
ROLLS  
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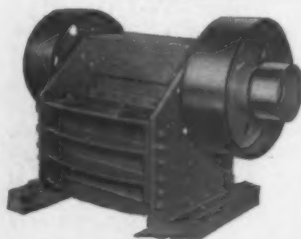
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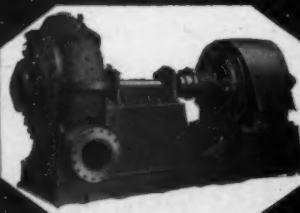
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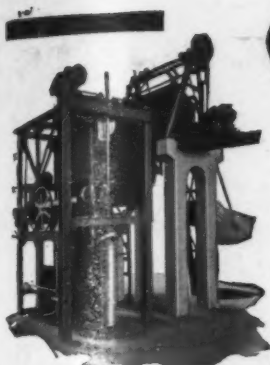


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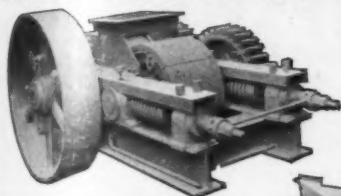
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All equipment necessary  
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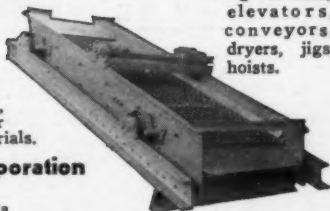
Single and double roll and  
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Complete portable, semi-  
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different capacities of any materials.

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**PULVERIZERS** for the reduction of  
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CAPACITIES: 1 TO 60 TONS PER HOUR

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MATERIAL HANDLING  
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In the production of stone, gravel, sand  
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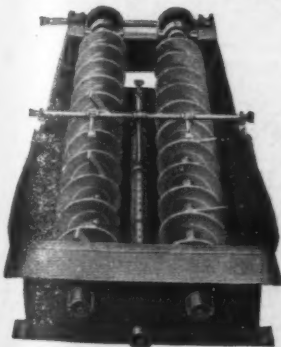
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All Kinds—For Sand, Gravel,  
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Guaranteed removal of  
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Excavation, Storing, Reclaiming.

Operating spans: 200 to 1500 ft.

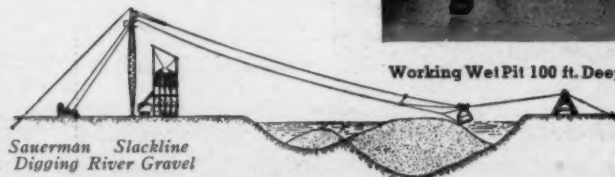
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## WILFLEY Centrifugal SAND PUMP

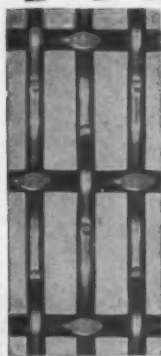
PATENTED  
for Slurry  
for Sand Tailings



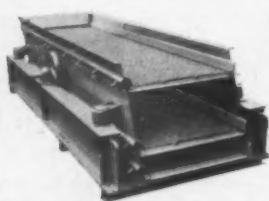
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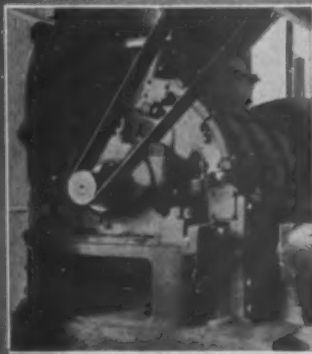


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**FARREL  
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SIZES 10" x 7" to 72" x 24"

Complete Plants Designed and Equipped.  
Screens, Elevators, Conveyors, Quarry,  
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60, 80, 130 & 360 HP Diesel Engines.  
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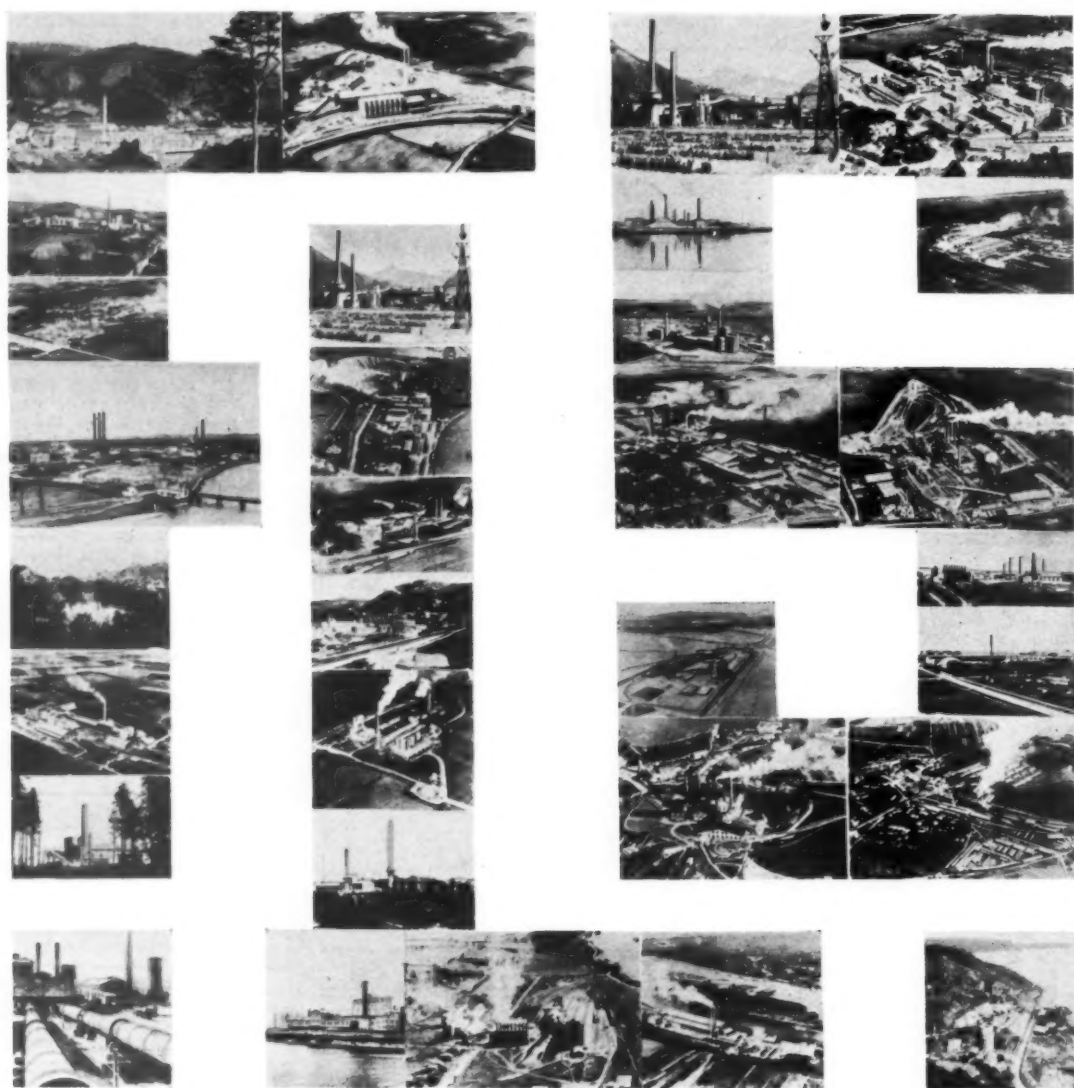
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